UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

FEBRUARY, 1885.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

BY JAMES ALLEN,
1ST LIEUTENANT, 3D CAVALRY, U. S. A., A. S. O. AND ASSISTANT.

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1885.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of February, 1885.

Name of vessel.	Observers.
Allan Line.	
Br. s. s. Circassian	Capt. R. H. Hughes.
Grecian	C. E. LeGallais.
Prussian	Alex. McDougall.
Scandinavian	John Park.
Siberian	E. P. Moore.
American Line.	
Br. s. s. British Crown	Geo. C. Burton.
British Princess	E. H. Freeth.
Am Illinois	Geo. H. Dodge.
Br. " Lord Clive	P. Urquhart.
Anchor Line.	
Br. s. s. Australia	Alex. McRitchie.
Devonia	Hugh Young.
Ethiopia	John Wilson.
Furnessia	L. Garrick.
Trinacria	Geo. Mitchell.
Anglo-Australian S. S. Co.	
Br. s. s. Port Phillip	Geo. Dulling.
Atlas Line.	
Br. s. s Allen	Jno. W. Sansom.
Alvo	David Williams.
Span. Andes	R. deEchevarrieta
Athos	Horatio Low.
Boston & Halifax Line.	
Am. s. s. Carroll	G. H. Brown.
Bristol-City Line.	
Br. s. s. Lord Clyde	T. L. Weiss.
California and Mexican S. S. Co.	
Am. s. s. Newbern	E. T. Rogers.
Canada Shipping Company.	
Br. s. s. Lake Huron	Wm. Bernson.
Lake Manitoba	Wm. Stewart.
Lake Nepigon	H. Campbell.
Cunard Line.	
Br. s. s. Aurania	W. H. P. Hains.
Bothnia	T. Roberts.
Catalonia	Alex. McKay.
Cephalonia	Henry Walker.
Gallia	M. Murphy.
Scythia	P. Wheelan.
Edward Carr's S. S. Line.	
Ger. s. s. Australia	G. Frank.
California	O. Winckler.
Furness Line.	
Br. s. s. Durham City	M. P. Lund.
Stockholm City	R. Doyle.
General Trans-Atlantic Steamship Co.	
Fr. s. s. Canada	G. S. deKersabiec.
Labrador	Périer d'Hauterive.
St. Laurent	M. de Jousselin.
Guion Line.	
Br. s. s. Alaska	Geo. S. Murray.
Arizona	Sam. Brooks.
Wyoming	C. L. Rigby.
Hamburg-American Line.	
Ger. s. s. Bohemia	R. Karlowa.
Gellert	W. Kühlewein.
Lessing	B. Voss.
Moravia	O. Pezoldt.
Rhaetia	H. Vogelgesang.
Rugia	A. Albers.
Wieland	C. Hebich.
Westphalia	H. Barends.
Inman Line.	
Br. s. s. City of Berlin	Francis S. Land
City of Montreal	Arthur Redford.
City of Richmond	A. W. Lewis.
Johnson Line.	
Br. s. s. Nessmore	John Inch.
Lamport & Holt's Steamship Company.	
Br. s. s. Hevelius	John Carroll.
Leyland Line.	
Br. s. s. Bulgarian	E. Parry.
Venetian	W. H. Trant.
Virginian	M. Fitt.
Liverpool, Brazil and River Plate Steam Navigation Company.	
Br. s. s. Olbers	James Clarke.
Mallory Line.	
Am. s. s Lampasas	M. B Crowell.
San Marcos	A. C. Burrows.

Name of vessel.	Observers.
Mediterranean and New York S. S. Co.	
It. s. s. Archimede	Capt. Domenico Viola.
Miss. & Dominion S. S. Co.	
Br. s. s. Brooklyn	Geo. S. Dale.
Ontario	W. P. Couch.
Oregon	H. C. Williams.
Toronto	Jas. McAuley.
Monarch Line.	
Br. s. s. Assyrian Monarch	John Harrison.
Morgan's La. & Texas R. R. & S. S. Co.	
Am. s. s. Chalmette	Robt. B. Quick.
National Line.	
Br. s. s. Canada	Wm. Pearce.
Erin	John Robinson.
France	Wm. Pearce.
Holland	Geo. Cochrane.
Spain	Jas. Sumner.
New York and Cuba Mail S. S. Co.	
Am. s. s. Cienfuegos	F. M. Faircloth.
N. Y., Havana & Mexican Mail S. S. Co.	
Am. s. s. City of Alexandria	J. W. Reynolds.
North German Lloyd Steamship Co.	
Ger. s. s. America	G. Meyer.
Donau	R. Ringk.
Eider	W. Willigerod.
Elbe	F. Hamelmann.
Ems	Ch. Leist.
Fulda	O. Heimbruch.
General Werder	H. Christoffers.
Habsburg	Fr. Pfeiffer.
Hermann	H. Baur.
Leipzig	C. Thalenhorst.
Main	H. Heilmers.
Neckar	R. Busius.
Nürnberg	A. Jaeger.
Salier	C. Wiegand.
Strassburg	H. Heincke.
Werra	J. Barre.
Weser	H. Bruns.
Ocean Steamship Company.	
Am. s. s. City of Augusta	K. S. Nickerson.
Occidental & Oriental S. S. Company.	
Br. s. s. Arabic	John Metcalf.
Oceanic	John Metcalf.
Oceanic Steamship Company.	
Am. s. s. Alameda	H. G. Morse.
Mariposa	H. M. Hayward.
Old Regular Line for Buenos Ayres.	
Am. s. s. Mendoza	Geo. W. Tucker.
Oregon Railway and Navigation Co.	
Am. s. s. City of Chester	Thomas Wallace.
Columbia	Fred. Bolles.
Oregon	E. Polemann.
Pacific Coast Steamship Company.	
Am. s. s. Ancon	John W. Ingalls.
Mexico	T. Huntington.
Orizaba	John N. Ingalls.
Santa Rosa	Chas. B. Johnson.
Pacific Mail Steamship Company.	
Br. s. s. Australia	R. C. Ghost.
Am. City of Peking	G. G. Berry.
City of Rio Janeiro	Wm. B. Cobb.
City of Tokio	Com. Jefferson Maury.
Colima	Capt. W. B. Seabury.
Granada	M. Connolly.
San Blas	Thos. Chapman.
Quebec Steamship Company.	
Br. s. s. Muriel	G. S. Locke.
Orinoco	Jas. S. Garvin.
Red "D" Line.	
Am. s. s. Caracas	W. M. Hopkins.
Red Star Line.	
Belg. s. s. Belgenland	W. A. Beynon.
Nederland	Allen J. Griffin.
Pennland	Rwd. Weyer.
Rhynland	J. C. Jamison.
Switzerland	H. Buschmann.
Waesland	J. Ueberweg.
Westernland	W. G. Randle.
Rotterdam Line.	
Dtch. s. s. Edam	J. H. Tant.
P. Caland	T. H. Bonjer.
W. A. Scholten	G. Bakker.
State Line.	
Br. s. s. State of Georgia	G. Moodie.

Name of vessel.	Observers.
State Line.—Continued.	
State of Nebraska	Capt. A. G. Brace.
State of Nevada	Jno. A. Stewart.
Thingvalla Line.	
Dan. s. s. Geiser	F. V. Schierbeck
Thingvalla	S. T. H. Laub.
U. S. and Brazil Mail S. S. Co.	
Am. s. s. Finance	A. H. Mandell.
Warren Line.	
Br. s. s. Iowa	Samuel Walters.
White Star Line.	
Br. s. s. Adriatic	H. Parsell.
Britannic	H. Perry.
Celtic	Benj. Gleadell.
Germanic	C. W. Kennedy.
Republic	P. J. Irving.
Wilson Line.	
Br. s. s. Galileo	Richard Potter.
Lepanto	Lieut. Rogers, R. N. R.
Marengo	Capt. J. H. Malet.
Otranto	F. Kerr.
Winser Line.	
Am. s. s. Norman	H. W. Goggins.
Saxon	S. W. Snow.
Miscellaneous.	
Br. s. s. Amethyst	Capt. Robt. Bennington
Biela	Fred. Graham.
Bracadale	E. Weddall.
Castleford	C. A. Sibthorpe.
Edith Godden	John H. Bennett.
East Anglia	W. H. Thomas.
Kairos	Thos. Liddle.
North Anglia	C. N. Mumford.
Ocean King	Geo. Denham.
Picqua	Wm. Clayton.
Strathleven	C. W. Pearson.
Sailing vessels.	
Am. bg. Abbie Clifford	Capt. David W. Storer.
sc. Abbie H. Gheen	W. W. Gheen.
Anna A. Holton	Geo. Smith.
bk. Antonio Sala	F. H. Mitchell.
sc. Arietis	J. H. A. Roberts.
Br. bk. Artisan	J. Dwyer.
Am. bg. Atlanta	H. S. Aldrich.
Ger. sp. Baltimore	N. Freese.
Am. bg. Caroline Gray	A. F. Pillsbury.
Br. bgt. Corisande	Daniel Thoms.
Ger. sp. Dora	H. Meyer.
Am. sc. Ettie H. Lister	Smith D. Mason.
Florence Rogers	Jas. S. F. McLeod.
Br bgt. George	W. H. Champlin.
Am. sc. Governor Hall	John Cain, Jr.
bk. Idaho	W. S. Richardson.
sc. Jennie B. Morse	A. D. Colcord.
John J. Hanson	Lucius J. Stevens.
bkt. Levanter	A. F. Vesper.
bg. L. & W. Armstrong	A. Alexander.
bg. L. F. Munson	Jas. A. Smith.
Br. bg. Lilian	H. F. Schive.
Am. bg. Mary Fink	Dan'l B. Darrah.
sc. Mary Nowell	Wm. M. Lank.
Moses Webster	G. W. Rhodes.
bg. Rising Sun	C. Y. Decker.
Nor. bk. Saga	O. P. Sövig.
Am. sc. Stephen Bennett	William Douglas.
Thomas Clyde	Alfred J. Biddle.
It. bk. Vincenzo Accame	A. V. Lavagna.
Am. sc. Viola Reppard	Lewis Ogier.
Br. bk. Winifred	N. P. Dutton.
"New York Herald Weather Service."	
Br. s. s. Adriatic	Capt. H. Parsell.
Alene	E. J. Sciders.
Britannic	H. Perry.
Am. Caracas	W. M. Hopkins.
Br. Carn Marth	W. C. Boynes.
Celtic	Benj. Gleadell.
Am. Chalmette	R. B Quick.
City of Alexandria	J. W. Reynolds.
Br. City of Richmond	A W. Lewis.
Am. Colon	S. G. Porter.
Ger. Eider	W. Willigerod.
Ems	Ch. Leist.
Br. Gallia	M. Murphy.
Dan. Geiser	F. N. Schierbeck.
Belg. Nederland	A. J. Griffin.
Dtch. P. Caland	T. H. Bonjer.
Br. Republic	P. J. Irving.
Am. Saratoga	John McIntosh.
Dtch. Schiedam	J. de Harnecourt
Br. State of Nebraska	A. G. Brace.
Belg. Switzerland	H. Buschmann.

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during February, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart i.

The paths of the centres of eleven atmospheric depressions are shown on chart i., and are described under "Areas of low barometer"; the average number of depressions for February during the last eleven years is twelve. The low area described as number viii. was of unusual severity along the Atlantic coast north of Virginia, and was accompanied by remarkably high tides, which, at numerous points are reported to have been the highest known for many years.

The month was colder than the average in all districts east of the Rocky mountains. In the lake region and central valleys the mean temperatures averaged from 10° to 15° below the normal. In the central Mississippi and Ohio valleys, in the Gulf states, and on the Atlantic coast south of New England the mean temperatures were the lowest that have occurred since the establishment of the Signal Service stations. The minimum temperatures occurring on the 10th and 11th during the prevalence of high-area number iii., were remarkably low, and in numerous instances they are reported to have been the lowest recorded in February during the period covered by Signal Service observations.

The precipitation was below the average in nearly all parts of the country, the exceptions being the Florida peninsula, Rio Grande valley, the northern and middle plateau districts, and a few isolated localities.

Very severe snow-storms occurred in the northern and western districts during the passage of low-areas v., vii., and viii. Railroads were blockaded and all kinds of travel interrupted.

In the preparation of this REVIEW the following data, received up to March 20th, 1885, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and seventeen Canadian stations, as telegraphed to this office; one hundred and fifty-seven monthly journals and one hundred and sixty-two monthly means from the former, and twenty monthly means from the latter; two hundred and seventy-six monthly registers from voluntary observers; forty-six monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly reports from the New England Meteorological Society, and from the local weather services of Alabama, Georgia, Illinois, Indiana, Louisiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The distribution of mean atmospheric pressure for February, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The regions of greatest mean pressure are inclosed by the the isobar for 30.2, and comprise parts of the northern and middle plateau districts, and a small area in northeastern Montana. The mean pressure is least over New England and the Canadian maritime provinces, where the barometric means decrease to 29.85 and below, the lowest, 29.81, being reported from Sidney, Nova Scotia. The isobar for 30.1 extends from Manitoba southward to the lower Rio Grande valley, and thence northwestward near the Mexican boundary to the coast of southern California; in the districts to the east of it the barometric means are lower and to the northward and westward they are higher, except in northern Washington Territory where the mean pressure falls to 30.01 at Tatoosh Island.

As compared with the mean pressure for the preceding month there has been a decrease in all parts of the United States, except at Cape Mendocino, California, and Fort Canby, Washington Territory, where a slight increase has occurred. In the Rocky mountain regions and in the northern districts to the eastward the decrease varies from .01 to .10; in the middle Atlantic and Gulf states, lower Missouri, central Mississippi, and Ohio valleys, and in Tennessee, from .10 to .15; in the south Atlantic states from .15 to .18.

The departures from the normal pressure for February are given in the table of miscellaneous meteorological data; they are also exhibited on chart iv. by lines connecting stations of equal departure. A very slight excess is shown in the central Rocky mountain districts, in northern California and southern Oregon, the departures not exceeding .03. In all other districts the mean pressure is below the normal, the deficiencies ranging from .01 to .07 west of the Mississippi; the deficiencies are most marked along the Atlantic coast, where they vary from .15 to .20.

BAROMETRIC RANGES.

The monthly ranges at the Signal Service stations are given in the table of miscellaneous meteorological data; they were greatest in the lower lake region, middle Atlantic states and New England, where they varied from 1.30 to 1.44, the greatest being reported from Erie, Pennsylvania; the monthly ranges were least in southern California, Arizona, and southern Florida, the smallest, 0.46, occurring at Key West, Florida, and Los Angeles, California.

AREAS OF HIGH BAROMETER.

During the month five areas of high barometer passed over the districts east of the Rocky mountains and one from the Pacific coast to the middle plateau district, where a well-defined area of high pressure was central at the last report of the

month. They were generally accompanied by a decided fall in temperature.

I.—The afternoon report of the 1st showed an area of high barometer extending from the upper lakes southwesterly over the upper Mississippi and Missouri valleys, the barometer having risen over this area from .20 to .50, and the temperature having fallen from 20° to 30°. This increase in pressure extended rapidly to the east and south during the 2d, the change in pressure ranging from .30 in southern to .60 in northern districts. During the 1st the temperature fell from 10° to 24° in the lake region and upper Mississippi valley, from 13° to 21° in Tennessee and the Ohio valley, and generally about 10° in the middle Atlantic states, except at Washington City, where it fell 30°. On the 2d the temperature fell from 11° to 36° in New England and from 4° to 11° in the south Atlantic states.

II.—During the 3d the barometer rose .15 to .31 in Manitoba. On the 4th the increase in pressure extended east to Lake Erie. On the 5th there was a decided rise in the barometer in all districts east of the Mississippi river, except in the south Atlantic states; in this district the rise occurred the next day, the change in pressure varying from .50 to .70. During this day (the 6th) the pressure increased decidedly in the middle Atlantic and New England states, with a still further rise in New England on the 7th. The centre of this area of high barometer moved from Manitoba (on the 4th) north of the lake region to the New England coast, which it reached during the night of the 7th. Accompanying the rise in the barometer a cold wave appeared in the extreme northwest on the 3d. On the 4th it extended over the lake region, with a fall in temperature of 8° to 18°, and as far south as Tennessee, where the temperature fell from 9° to 16°. On the 5th there was a fall of 20° to 30° in the lake region and Ohio valley, 13° to 17° in the Mississippi valley, and from 5° to 14° in Tennessee and the Gulf states. The minimum temperature occurred in the districts on the Atlantic coast on the morning of the 7th.

III.—This area appeared in the Northwest Territory on the 6th, where the barometer remained highest during the 7th, 8th, and 9th. During the 10th the centre moved southeasterly and at midnight was in the west Gulf states. During the next day the centre moved easterly and, at midnight of the 11th, the barometer was high on the south and middle Atlantic coasts. During the 7th the increase in pressure extended over the upper Mississippi and Missouri valleys, and, on the 8th, while continuing to rise in the extreme northwest, the pressure increased from .21 to .58 over the lower lakes. During the night of the 8th the wave of increasing pressure was divided by the advance of low area number v. from the southwest, so that, while the morning report of the 9th showed a decided rise west of the Missouri valley and New England and the middle Atlantic states, the barometer had fallen from .30 to .40 in the Ohio valley and Tennessee, the fall extending northward over lakes Michigan and Erie, and southward over the east Gulf and south Atlantic states. The rising barometer in New England and the middle Atlantic states was followed during the day by a very decided fall as low area number v. advanced. In the rear of this depression the barometer rose rapidly, the increase in pressure reaching the Atlantic coast on the 10th and continuing until the morning of the 12th. Accompanying the high barometer a cold wave appeared in the Northwest Territory and Montana on the 6th. During the 7th it extended to the upper Mississippi and Missouri valleys and southwesterly to Texas. On the 8th the temperature fell decidedly in all districts except on the Atlantic coast and in the east Gulf states. The eastward movement of the cold wave was checked during the 9th by low area number v., but, on this day, the temperature fell from 10° to 21° in the upper lake region, Tennessee, and the Ohio valley, and east Gulf states; from 25° to 40° in the west Gulf states; and from 14° to 27° in the upper Mississippi and Missouri valleys. The cold wave reached the Atlantic coast on the 10th, the temperature during the day falling 20° to 30° from Florida to Maine, and 10° to 40° in the lake region. The minimum temperature occurred in the lake region, Tennessee and the Ohio valley, and the Gulf states on the morning of the 11th and in the districts on the Atlantic coast on the morning of the 12th.

IV.—This area of high barometer appeared central in Montana on the 11th. During the 12th it moved into the Mississippi valley, thence to the east and north to the Saint Lawrence valley. On the 14th the centre of high pressure was over the Gulf of Saint Lawrence, remaining there during the 15th. On the 11th the rise in the barometer extended from the Northwest Territory south to Colorado. On the 12th the pressure increased over the lake region, the upper Mississippi valley, and over the Canadian Maritime Provinces on the 13th. A fall in temperature of 5° to 10° in Montana, extending into the northern portion of the Missouri valley, was reported on the 11th, and a fall of 4° to 12° in the upper lake region and 15° to 25° in the upper Mississippi valley on the 12th. The cold wave reached the Atlantic coast on the 13th, causing a fall of 5° to 10°, the minimum generally occurring on the morning of the 14th.

V.—This high area appeared in Montana on the 14th, the increase in pressure during the day extending over the Missouri valley, Wyoming, and Colorado. The pressure remained highest in the northwest during the 15th, the increase in pressure extending southward to the Gulf, the rise in Texas during the day being from .30 to .40. This marked rise in the barometer, extending during the following day over the east Gulf and south Atlantic states, transferred the centre of high pressure to northern Florida on the 16th. The barometer remained high on the south Atlantic coast during the 17th, the pressure increasing over the Atlantic coast districts from .10 to .70. A cold wave appeared on the 14th over the northern slope, and during the day extended over the middle and southern slopes of the Rocky mountains; during the 15th it moved as far east as Lake Michigan and southward to the Gulf, the temperature falling from 14° to 21° in the upper Mississippi and Ohio valleys. It reached the middle and south Atlantic coast the next day, the greatest change being in the lake region, where the temperature fell from 12° to 43°. The minimum temperature occurred in the middle and south Atlantic states and in the lake region on the morning of the 17th, and in New England on the 18th.

VI.—This high area appeared in the Saskatchewan valley on the 17th, where it remained during the 17th, 18th and 19th. On the morning and afternoon the area of highest barometer was over the Missouri, and southern portion of the Mississippi valleys; by midnight, however, a change in pressure caused the centre of high pressure to again appear in the Saskatchewan region. It moved into the upper lake region on the 22d, and on the 23d was over lake Erie; it reached the middle Atlantic coast on the 24th. A cold wave appeared in Montana on the 17th and during the day extended south over Wyoming, Colorado, and Nebraska, the temperature falling from 12° to 32°. On the 18th the cold wave reached the Gulf states, the temperature falling from 8° to 22° in the west, and from 10° to 26° in the east Gulf states, and from 20° to 27° in Tennessee. The temperature fell from 6° to 10° in the south Atlantic states on the 19th, and from 7° to 11° on the 20th, and on the same day from 8° to 15° in the middle Atlantic states. The minimum temperature occurred in the Gulf states on the morning of the 19th, and in the south and middle Atlantic states on the morning of the 21st.

VII.—This high area advanced from the Pacific coast on the 24th, and on the morning of the 25th it was central in Utah, the barometer reading highest at Salt Lake City, where it remained highest until the morning of the 27th, when the greatest pressure was at Portland, Oregon, with a ridge of comparatively high barometric readings from that point southeasterly to the Gulf of Mexico. On the 27th the area of highest pressure was over Idaho, and during the 28th it moved southerly and at the last report of the month was again central near Salt Lake City. A cold wave appeared over the north Pacific coast

region on the 26th, the temperature falling from 9° to 13°. On the 27th it had extended eastward to Dakota and to the southeast over Utah, and on the following day caused a slight fall in temperature in the Missouri valley, and from 11° to 18° in Wyoming, Colorado, and northern Texas, and from 13° to 22° in Dakota and Minnesota.

AREAS OF LOW BAROMETER.

On chart i. are traced the paths of the centres of eleven areas low barometer, which are herein described.

The following table shows the latitude and longitude in which the centre of each area was first and last located, and the average hourly movement.

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long W.	
	° ′	° ′	° ′	° ′	
No. I	44 00	77 00	47 00	62 00	26.0
II	49 00	99 00	42 30	64 00	35.0
III	35 00	89 00	41 30	67 30	49.0
IV	43 30	95 30	45 30	59 00	55.0
V	29 30	97 00	50 00	61 30	42.0
VI	30 00	79 30	34 00	71 00	38.0
VII	41 30	101 30	45 00	84 30	30.0
VIII	37 30	76 30	47 00	58 00	29.0
IX	41 30	101 00	39 00	74 30	58.0
X	27 00	94 00	36 00	74 00	56.0
XI	51 00	109 00	46 00	82 00	28.0
Mean hourly velocity					40.5

I.—This low area is a continuation of number xi. described in the January REVIEW. On the morning of February 1st the centre was near Lake Ontario; it then moved directly eastward to the Atlantic coast, and thence northeastward to the Gulf of Saint Lawrence. Snows occurred in the lower lake region and in the New England and middle Atlantic states on the 1st, followed in the last two districts by fair weather. On the summit of Mount Washington, New Hampshire, when the centre of this low area was near Prince Edward Island, a northwesterly hurricane prevailed on the 2d, the wind reaching a velocity of one hundred miles per hour, and the temperature ranging from —15° to —38°; the hurricane continued on the 3d, the wind reaching ninety-nine miles from the northwest with a temperature from —11° to —33°.8.

II.—This low area appeared on the morning of the 3d, central in Manitoba; at midnight of the same day the centre was over Lake Michigan, and on the morning of the 5th passed off the New England coast near Boston, Massachusetts. Snow fell in the lake region on the 2d, continuing on the 3d, 4th, and 5th. Rains occurred in New England and the middle Atlantic states on the 4th. The morning report of the 2d showed a rise in temperature of 30° to 40° in northern Minnesota and in Manitoba, the warm wave extending south to Missouri; during the next twenty-four hours it extended eastward over all the districts, except New England, where the rise in temperature did not occur until the afternoon of the 3d. The morning report of the 4th showed a further rise in all districts east of the Mississippi valley of 10° to 20°. High west to northwest winds prevailed in the lake region and on the middle Atlantic coast on the 4th.

III.—This area developed in the Gulf states during the 4th, and on the morning of the 5th was central near Memphis, Tennessee. Generally cloudy weather prevailed in all districts, and north of Tennessee, accompanied by snow and rain. The storm-centre moved southeasterly to the South Carolina coast, and then, recurving to the northeast, passed up the coast; it is further described in this REVIEW as number 5 of the north Atlantic storms. Rain or snow fell in all districts east of the Rocky mountains on the 5th, clearing on the Atlantic coast on the 6th, but continuing in the western districts in advance of low area number iv. The morning report of the 5th showed a slight rise in temperature in the Gulf states, but the movement of the centre of this low area caused the winds east of the Mississippi generally to shift to the northwest and the temperature to fall from 10° to 30° on the 5th. On the Atlantic coast a further fall in temperature of 10° to 16° occurred on the 6th. The following maximum wind velocities were reported; midnight of the 5th, twenty to forty miles on the south Atlantic coast; morning of the 6th, seventeen to forty miles on the middle and south Atlantic coasts; midnight of the 6th and morning of the 7th, twenty-five to forty-seven miles on the New England and middle Atlantic coasts.

The following notes are reported by Signal Service observers:

Pensacola, Florida, 5th: high winds prevailed from 12.25 to 4 p. m., the maximum velocity being thirty-two miles southwest; this was the severest storm that has occurred in this vicinity for twelve months.

Cedar Keys, Florida: the severest storm for several months occurred on the 5th. The steamer "Bertha Lee" was driven from her moorings, and had a part of her wheel-house blown off. The lowest reading of the barometer was observed at 7.40 p. m.

Jacksonville, Florida: a thunder-storm accompanied by hail and high wind prevailed during the evening of the 5th; the wind attained a velocity of forty miles per hour.

Charleston, South Carolina: a violent thunder-storm passed over this station from southwest to northeast between 8.45 and 9.10 p. m. on the 5th, the wind attaining a velocity of thirty-two miles from the southwest.

Savannah, Georgia, 5th: flashes of lightning were observed at 7 p. m.; at 7.56 p. m. a severe storm set in, the wind blowing at the rate of forty miles per hour for about twenty minutes. Rain fell in torrents, accompanied by loud thunder and vivid lightning. Considerable hail fell during the first part of the storm. Vessels arriving at this port report having experied rough weather on the 5th and 6th. The steamer "William Kennedy" was wrecked during the storm.

The "Savannah News" of February 13th states that during the storm of the 5th, the government hospital at Paris Island and numerous houses at Saint Helena Island were blown down.

IV.—This low area first appeared as a storm centre in northern Iowa on the morning of the 6th. At the afternoon report it was central near Keokuk, Iowa. This same report showed a fall of .40 to .50 in pressure over Utah. This decided decrease in pressure extended to the southeast during the next eight hours, and at midnight the storm-centre was in western Kansas. From this date it moved northwesterly to Lake Ontario and thence to Nova Scotia. Snow was reported from the upper Mississippi and Missouri valleys on the morning of the 6th, where it continued during the day, the snow area extending into the upper lake region. Snows were reported from the upper Mississippi valley and the lake region on the 7th, and from northern New England on the 8th. During the night of the 5th the winds in the upper Mississippi and Missouri valleys shifted to the south, and the morning report of the 6th showed a rise of 6° to 10° in temperature. This warm wave extended rapidly to the eastward, the temperature rising from 7° to 20° over the lake region, Tennessee and the Ohio valley, and the Gulf states on the 6th, and from 10° to 20° in the lower lake region, Tennessee and the Ohio valley, and the Gulf, middle, and south Atlantic states on the 7th, and from 7° to° 8° in the Atlantic coast districts on the 8th.

V.—This low area developed in the west Gulf states during the night of the 7th and morning of the 8th. On the afternoon of this day the centre was in Texas; its general course from this date was northeasterly until the morning of the 10th, when it was central in the Province of Ontario; during the next eight hours it moved to the southeast, then again recurved to the northeast and moved off the Gulf of Saint Lawrence. Rain occurred in the east Gulf and south Atlantic states on the 8th, and in the Gulf, south Atlantic, and southern portion of the middle Atlantic states on the 9th. Snow fell on this day in the lake region and northern part of the middle Atlantic states, and on the 10th in the lower lake region, New England, and the middle Atlantic states. High winds prevailed on the

Texas coast during the 7th, 8th, 9th, and 10th; maximum velocities of forty-four miles at Indianola and thirty-six miles at Galveston were reported. The following velocities were reported from the lake and coast stations: on the 8th, thirty miles on Lake Erie; on the 9th, twenty-five to forty-three miles on the lakes, and twenty-five to thirty-two miles on the New England and middle Atlantic coasts; and from thirty to forty-seven miles on the New England and middle Atlantic coasts on the 10th and 11th.

Signal Service observers report the following:

Buffalo, New York: a severe southwesterly storm set in at 11 p. m. on the 9th and continued during the night, a velocity of fifty-six miles occurring at 2.15 a. m.

Rochester, New York: during the evening of the 9th, the wind increased to forty miles per hour, and during the night it veered from south to west and continued high until the early morning of the 11th, a maximum velocity of forty-five miles occurring at 12.15 a. m. of that date.

Mount Washington, New Hampshire: a westerly hurricane of one hundred and one miles per hour, with temperature from —16° to —32°, prevailed on the 10th.

New London, Connecticut, 9th: high southeasterly winds began at 9 p. m. and continued until 5.45 a. m.; a maximum velocity of forty-five miles, southeast, was recorded at 3.05 a. m.

Point Judith, Rhode Island, 9th: a high easterly wind set in at 4.30 p. m., later it veered to southeast and continued all night. From 1 to 4 a. m. on the 10th, the storm was very severe, the wind blowing at the rate of about forty-five miles per hour.

Eastport, Maine, 10th: high winds prevailed at intervals during the day; a velocity of thirty-six miles from the east occurred at 2.55 p. m. All telegraph lines west of Bangor were prostrated.

VI—The centre of this low area was near Jacksonville, Florida, on the morning of the 14th; it moved to the northeast, the centre some distance from the coast; it is further described as number 7, under "north Atlantic storms." The winds along the Atlantic coast were generally from northeast to northwest with velocities from twenty-five to fifty-two miles. Rain occurred in the south Atlantic states and snow in the middle Atlantic states on the 14th, and snow in New England and the middle Atlantic states on the 15th. There was a slight fall in temperature along the Atlantic coast from the morning of the 14th to the morning of the 15th.

VII.—This low area appeared central in Nebraska on the afternoon of the 13th, and on the morning of the 14th was central in southern Colorado. At this time number vi. was central near Jacksonville, Florida, and while the latter was moving up the coast number vii. moved into the Mississippi valley, and on the morning of the 15th was central near Saint Louis, Missouri, and during the day and night it passed over the lake region. Snow fell in the upper Mississippi and Missouri valleys on the 14th, and in the Mississippi valley, lake region, Tennessee and the Ohio valley, and middle Atlantic states on the 15th; rain occurred on this day in the south Atlantic and east Gulf states, and snow in the lower lake region, New England, and middle Atlantic states on the following day. Velocities of twenty-five to thirty miles were reported from the lake region on the 15th, and twenty-five to forty miles on the 16th; on the Atlantic coast velocities of twenty-five to forty-seven miles were reported on the 16th. Accompanying the fall in the barometer a warm wave appeared over the northern slope of the Rocky mountains on the morning of the 13th; by the next morning it covered all the districts east of the Rocky mountains except those on the Atlantic coast. Its advance over these districts was prevented during the next twenty-four hours, by the passage of low area number vi. moving up the coast. After this had passed, the warm wave advanced, and from the morning of the 15th to the morning of the 16th the temperature rose from 10° to 19° in the Atlantic coast districts.

VIII.—The morning report of the 16th showed this low area central near Cape Henry, Virginia, where the barometer had fallen .58 in eight hours. General and heavy rains occurred during the night in the south Atlantic states with wind velocities on the coast of eighteen to thirty-two miles. The storm moved rapidly to the north until near the Saint Lawrence valley; thence it passed off to the east over Nova Scotia. Snow fell in New England and the middle Atlantic states on the 16th with high winds on the coast, maximum velocities of twenty-five to forty-seven miles being reported. In the lake region and on the Atlantic coast the temperature fell from 10° to 28° from the morning of the 16th to the morning of the 17th.

The following notes are from the reports of the Signal Service observers:

Atlantic City, New Jersey: an easterly gale prevailed during the morning of the 16th, the wind reaching a velocity of forty miles per hour. The tide rose to an unusual height and caused much damage to property near the water-line.

Little Egg Harbor, New Jersey, 16th: high southeasterly shifting to southwesterly and northwesterly winds prevailed during the day. The high tides washed away the bath-houses, fences, &c., in this vicinity, and the coast telegraph line was blown down.

Sandy Hook, New Jersey: very heavy surf and dangerously high winds prevailed on the 16th. The tide was very high, the water coming within twenty feet of the signal office; a part of the New Jersey Southern Railroad at Highland station was washed away.

New York City, 16th: high southeasterly winds set in at 6 a. m.; a maximum velocity of forty miles occurred at 8.18 a. m. The tide was the highest that has occurred for many years. At 10.05 a. m the water was on a level with the wharves on the west and south water fronts, and at Battery park the sea broke over the wall. In the lower streets cellars and basements were flooded, resulting in much damage.

New Haven, Connecticut, 16th: high northeasterly winds prevailed during the afternoon and evening; a maximum wind velocity of fifty miles per hour occurred at 4.50 p. m. This storm was of unusual severity throughout this section and caused considerable damage; in this city plate-glass windows were blown in and other damage caused. The tide rose to a height three feet above high-water mark; the sewers of this city were flooded and many bath-houses, together with five hundred feet of Kelsey's wharf were washed away.

New London, Connecticut, 16th: the severest storm which has occurred since the establishment of this station began at 7.05 a. m., the wind blowing from the east; the storm reached its height (forty-eight miles, east) at 5.15 and subsided at 8.15 p. m., the wind meanwhile veering to west; much damage was caused in this locality. The roof of the New London steam woolen mill was blown off and many outbuildings, signs, &c., were blown down. Between 8 and 9 p. m. the tide was very high and flooded many cellars in the lower part of the city. The total movement of the air for the twenty-four hours ending at 11 p. m. was six hundred and thirteen miles, which exceeds by one hundred miles the highest daily movement previously recorded at this station.

Narragansett Pier, Rhode Island, 16th: during the morning high easterly winds prevailed which increased in force and reached a maximum velocity, estimated at sixty-five miles per hour at 1.45 p. m.; it continued with great violence until 8.40 p. m., the wind shifting from southeast to southwest. The high southeasterly winds caused the heaviest surf and highest tide that have occurred since the establishment of this station. Had the wind continued from the southeast a few hours longer, it is probable that damage to the extent of $100,000 would have resulted. The observer at Point Judith reports a maximum wind velocity of sixty-five miles at 6 p. m., and states that the seas broke over the banks in many places. The men of the Life-Saving Service state that the tide was the highest that has occurred since the Life-Saving station was established in 1876.

Block Island, Rhode Island, 16th: high southesterly winds, increasing to a strong gale, prevailed during the day, causing the highest tide known for many years. The steamer "Danielson" was blown from her moorings and damaged; several small houses were blown over and carried away by the sea.

Boston, Massachusetts, 16th: high winds set at 9.30 a. m., and continued during the day, a velocity of fifty-four miles from the east occurring at 5 p. m. This storm is considered one of the severest experienced for several years. Reports from Newport, Rhode Island, state that at that place the wind reached a velocity of fifty miles, and from Fall River, Massachusetts, a velocity of sixty-five miles is reported. The storm was accompanied by heavy snow, and in the interior of Massachusetts the railroads were blockaded. The high winds continued until the afternoon of the 17th.

Mount Washington, New Hampshire: a southwesterly hurricane prevailed on the 16th, the wind reaching a velocity of one hundred and eight miles per hour. Two anemometers were rendered temporarily useless during the storm, and it was with much difficulty that they were replaced during its violence. From the Ammonoosuc valley it is reported that the severest storm for many years prevailed on this date, and that the snow fell to depths of from eighteen to twenty-four inches.

IX.—This low area appeared central in Nebraska at midnight of the 16th; it moved southeasterly until the next afternoon, after which time it moved slightly north of east and passed off the Atlantic coast on the morning of the 18th. Snow fell in the upper Mississippi and Missouri valleys during the night of the 16th; in the upper Mississippi valley, the lake region, Tennessee and the Ohio valley, and the Gulf and middle Atlantic states on the 17th, and in the middle Atlantic states on the 18th, with wind velocities, on the coast, of eighteen to thirty miles. During the 16th the temperature rose in the Missouri valley from 8° to 21°; during the following twenty-four hours this warm wave was felt in all districts to the east of the Mississippi river except in New England; in the last-district the temperature rose from 6° to 10° on the 18th At Fort Maginnis, Montana, a high westerly wind prevailed from 12.40 to 9.30 p. m., on the 16th; a velocity of sixty-four miles per hour was recorded at 7.20.

The observer at Denver, Colorado, reports the following: on the 16th a high wind set in at 12.40 p. m., and continued until 10.15 p. m.; the wind reached a velocity of sixty-two miles from the west at 4.35. The Denver and Rio Grande car shops were damaged and three cars were blown from the track.

X.—This low area moved from the Gulf of Mexico across the east Gulf and south Atlantic states during the day and night of the 24th. It was attended by general and heavy rains in the Gulf and south Atlantic states, and snow in the middle Atlantic states and southern New England. The following wind velocities were reported: Indianola, Texas, thirty-four miles; Galveston, Texas, twenty-five miles, New Orleans, Louisiana, thirty-two miles, and twenty-five to thirty-six miles on the south and middle Atlantic coasts. The morning report of the 25th showed a rise in temperature of 10° to 30° in the districts on the Atlantic coast.

XI.—This low area first appeared in the Saskatchewan valley at midnight of the 26th; it moved easterly and north of the lake region, and at the last report of the month was central just north of Lake Huron. Cloudy weather prevailed in the lake region from the 26th to the 28th, with snow on the 26th and 27th, and the upper lakes on the 28th; no high wind velocities were reported. A warm wave accompanying this depression appeared in the Missouri valley at midnight of the 26th, where the temperature rose from 3° to 13°. On the 27th the temperature rose from the upper lakes south to the Gulf, and on the 28th in all districts east of the Mississippi river.

REDUCTION OF BAROMETER READINGS TO LATITUDE 45°.

The following memorandum is published with a view to elucidating the nature of the gravity correction as applied to barometric observations, a matter that is not fully explained in the ordinary text books of meteorology.

By the well-known principle of hydrostatics on which the action of the mercurial barometer is based, the pressure of the atmosphere is equal to the pressure of the column of mercury that it will support. But this latter pressure is only another name for the weight of the mercury, and for columns of equal section, the weight varies both with the height of the column and with the force of gravity.

The force of gravity varies with latitude and altitude, therefore the height of the barometer (corrected for temperature and instrumental error) cannot be directly used as a true measure of the atmospheric pressure, but must be reduced to what the height would have been if the force of gravity and the weight of a given mass of mercury were constant all over the earth.

The force of gravity at the latitude of 45° and sea-level is assumed as the standard value to which barometer readings shall be reduced and is called "standard gravity." Our unit of mass becomes a standard unit of weight when weighed in vacuo at latitude 45° and sea-level.

According to the formula for the force of gravity adopted by the International Bureau of Weights and Measures, we have for the variations in gravity due to the latitude

$$G_\varphi = g_{45^\circ}\,(1 - 0.00259\cos 2\varphi)$$

The variation in the force of gravity for different altitudes is small and is given by the formula $g_h = g_0\,(1 - 11400000^{-1}\,h)$

Neglecting this latter factor, the gravity correction consists, therefore, in multiplying the height of the barometer by the factor $(1 - 0.00259\cos 2\varphi)$.

This is accomplished practically by computing a table of corrections with the latitude as an argument, the height of the barometer being assumed for low stations as 30 inches.

Observations of aneroid barometers do not need this correction as their readings are dependent on the elasticity of metal; this may vary with instrumental temperature, but does not depend on gravity; but they do need a correction to take account of the latitude in which they stood when compared with the standard mercurial barometer by which their scale was adjusted, unless the readings of that mercurial were already reduced to standard gravity.

It should be noticed that when the barometer is thus corrected for its peculiar error due to the influence on it of variations of gravity, the pressure that it then gives is the actual pressure of the air at each latitude expressed in terms of an absolute and not a variable standard.

It is important to remember that the barometer does not indicate directly the simple weight of the atmosphere. Thus in a storm-centre the weight of the air above the barometer is partly counter-balanced by the centrifugal force accompanying the wind; the barometric pressure is due not only to the weight of the air, but also to the prevailing winds, the rapid heating or cooling and consequent expansion and contraction of low layers of air, and to other causes.

In the mercurial barometer we balance this gaseous molecular elastic pressure by the gravitation or weight of quiescent mercury; a change of the force of gravity will change the weight of the column of mercury without necessarily changing the atmospheric pressure.

NORTH ATLANTIC STORMS DURING FEBRUARY, 1885.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0-10.]

The paths of the depressions that have appeared over the north Atlantic ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports obtained through the co-operation of the "New York Herald Weather Service," and from other miscellaneous data received at this office up to March 23d, 1885.

The attention of international co-operating observers is called to the change in the time of recording the simultaneous obser-

vation, which is now taken at 7 a. m., seventy-fifth meridian *(eastern)* time, corresponding to noon Greenwhich time, or eight minutes earlier than heretofore.

Eleven depressions are traced over the ocean within the region covered by the reports. Five of these, viz: numbers 3, 4, 5, 7, and 8, are continuations of storms which passed into the Atlantic from the North American continent. Of the remainder, the depression charted as number 2, apparently developed over the region between Bermuda and the coast of the United States; numbers 9 and 10 appeared near N. 40°, and between the meridians of 40° and 60° W., and numbers 1, 6, and 11, are shown to the eastward of the first-mentioned meridian. The general direction of movement of these depressions was to the northeastward, but at somewhat lower latitudes than usual; especially is this noticeable with reference to the tracks of numbers 6, 7, 9, and 10.

The weather over the Atlantic during the month of February, 1885, was, with the exception of a few days in the middle of the month, of a very stormy character; along the coast of the United States south of 38° N., it is reported by captains of coasting vessels to have been unusually stormy and unsettled. The barometer remained generally low throughout the month, and in some of the depressions charted it fell below 29.0 (736.6). Over the region south of 50° N. and east of the forty-fifty meridian, the winds were mostly easterly, strong in force, while in the region west of the above-mentioned meridian, and between 45° and 50° N., they were from sw. to nw., blowing with the force of a moderate to strong gale; south of 45° N. and along the coast of the United States they were variable, blowing strongly from e., s., nw., and n.

The following are brief descriptions of the depressions charted:

1.—This was probably a continuation of the depression traced as number 9 on the chart for January. At the close of that month an extensive area of low barometer occupied the ocean north of the forty-fifth parallel; these conditions, accompanied by steadily decreasing pressure, continued during February 1st and 2d, and on the latter date the centre of disturbance apparently passed to the northeastward over the British Isles. During those dates the disturbance extended southward as far as the Azores, the barkentine "Corisande," off Fayal, reporting barometer 29.39 (746.5), with w. gale of force 7. Heavy gales from sw. to nw., occurred over the region from the Bay of Biscay westward to the thirtieth meridian. The following are some of the lowest barometer readings observed during this depression. The s. s. "Gallia," M. Murphy, commanding, at 8 a. m., on the 2d, in N. 51° 20′, W. 15° 0′, had a minimum reading of 28.32 (719.3), wind se. to nw., strong gale; s. s. "England," T. S. Healy, commanding, in N. 50° 56′, W. 11° 55′, at noon on the 2d, barometer, 28.66 (728.0), wind sw., fresh gale; s. s. "Egyptian Monarch," W. S. Morgan, commanding, in N. 49° 00′, W. 13° 27′, at noon, barometer 28.76 (730.5), wind sw., whole gale; s. s. "Labrador," Perier d' Hauterive, commanding, from the 1st to the 2d, between N. 49° 10′, W. 26° 30′, and N. 46° 12′, W. 39° 30′, had pressure ranging from 28.74 (730.0) to 28.94 (735.0), wind from sse. to nw., whole gale. The pressure over the region near N. 50° and between the British coasts and W. 30°, did not exceed 29.0 (736.6) until the 3d.

2.—This was probably a continuation of a storm which developed between Bermuda and the coast of the United States on the last of the preceding month. The gale began about noon of January 31st, from ese. to sse. with falling barometer; by 4 p. m. of February 1st the s. s. "Glenfyne" E. H. Dunn, commanding, in N. 32° 40′, W. 72° 05′, had barometer down to 29.3 (744.2), whole gale from ese. veering to n., with heavy rain squalls and thunder and lightning; the s. s. "Edith Godden," J. H. Bennett, commanding, had the lowest barometer, 29.68 (753.9), at 3.30 a. m., on the 1st, in N. 31° 46′, W. 74° 21′, wind ese. to sw. and nw., blowing with the force of a fresh gale. At 7 a. m. the bark "Rosina," G. Tomaselli, commanding, in N. 32° 32′, W. 71° 52′, had barometer 29.52 (749.8), wind nnw., force 9, squally; while the s. s. "Sir Garnet Wolseley," D. Morgan, commanding, near N. 35° W. 60°, had violent gales from s. to w., and reported on the morning of the 1st moderate gale from s. with a deluge of rain; 2 p. m., wind became moderate; 3 p. m. squally from wsw. and increasing to the force of a hurricane until 4. a. m. of the 2d; lowest barometer (aneroid, corrected) 29.28 (743.7), at midnight of the 1st. The brig "Sarah E. Kennedy," Captain Walters, had a heavy ne. gale veering to nnw., in N. 34° 43′, W. 74° 50′, on the 1st, during which she lost sails.

By the morning of the 2d the depression had reached N. 40°, W. 60°, attended by moderate to strong easterly winds to the northward, and strong nw. and n. gales to the westward and southwestward. As the disturbance moved eastward the winds increased to the force of a gale, the s. s. "Nürnberg," A. Jaeger, commanding, reporting barometer 29.01 (736.8), at 7 p. m. of the 2d, in N. 40° 52′, W. 50° 23′, the east wind of force 9 decreasing to force 4, and shifting slowly through s. and w. to wnw., when it increased to a whole gale with rising barometer.

On the 3d, the depression was off the eastern coast of Newfoundland, where it was joined by number 3, which had moved over the Gulf of Saint Lawrence during the 2d; strong w. and nw. gales now prevailed over the region between W. 50° and 65°, accompanied by very heavy and dangerous seas, which caused some damage to steamers.

During the 4th and 5th the disturbance moved northeastward, causing w. gales of nearly hurricane force over the region to the south of its track, and, by the 6th, it had reached the coasts of the British Isles, the pressure near the centre being about 29.0 (736.6) During its passage northeastward this disturbance was accompanied by heavy rain, thunder and lightning, the rain changing to sleet and snow with the shift of wind to the westward; the minimum pressures reported were: 29.00 (736.6) at noon of the 5th, in N. 48° 14′, W. 37° 48′; 29.11 (739.4) in N. 49° 30′, W. 22° 26′, from 8 p. m. to 8 a. m. of the 5-6th; 29.18 (741.2) at noon of the 5th, in N. 47°, W. 38° 49′; 29.10 (739.1) on the 6th, in N. 50° 24′ W. 18° 0′.

3.—This was a continuation of the depression described as low area i., under "Areas of low barometer." It passed over the Gulf of Saint Lawrence during the 2d, with pressure near the centre about 29.25 (742.9), and on the following day it merged in the depression above described.

4.—This was a continuation of a disturbance which passed into the Atlantic from the New England coast on the 5th, being that described as low area ii. under "Areas of low barometer." On the morning of the 6th it was apparently central on the Banks of Newfoundland, the minimum barometric reading reported, being 29.28 (743.7); moderate n. and nw. gales occurred over the region from Nova Scotia to W. 58°, with strong s. and se. winds between N. 45° and 50° and W. 40° and 50°. On the 7th the depression was off the eastern coast of Newfoundland, the pressure remaining unchanged, and after this date it cannot be traced as a separate storm.

5.—This was a continuation of low area iii. described under "Areas of low barometer." It passed off the Carolina coast about midnight of the 5th, and was accompanied by very heavy gales along the coast of the United States during its passage northeastward. The following reports indicate the severity of the gales during the 6th; the schooner "E. B. Leisenring," Captain Davidson, reported at noon of the 5th, in N. 28° 31′, W. 79° 57′, had a fresh gale from sw. shifting suddenly at 11 p. m. to nw. and blowing with hurricane force until midnight; at 10 p. m. the barometer read 29.31 (744.5).

On the 6th the s. s. "Orinoco," J. S. Garvin, commanding, reported 7 a. m. barometer 29.22 (742.2), fresh wind from ne.; noon (N. 37° 58′, W. 70° 46′), barometer 28.89 (733.8), strong ne. gale, with thunder, lightning, and rain; ship hove to until 9 p. m., and during that time the wind blew with hurricane force; at 4 p. m. the barometer read 29.17 (740.9), and by 4 a. m. of the 7th the wind had hauled to nw. and was blowing a fresh gale, barometer 29.52 (749.8). The s. s. "Flamborough,"

P. J. Fraser, commanding, at 7 a. m. on the 6th, in N. 37° 45′, W. 73° 45, had barometer 29.37 (746.0), wind of hurricane force from e. backing to n. and wnw.; on the same date the bark "Sarou," in N. 34° 27′, W. 71° 13′, had a heavy gale from w. and nw., and was obliged to scud before the wind from 5 p. m. of the 6th until 7 p. m. of the 7th. The ship "Jabez Howes," on the 6th experienced a hurricane from e., se., s., sw., and nw., in N. 36° 45′, W. 71° 30′, which lasted thirty hours, with thunder, lightning, and heavy rain; the lowest barometer was 28.85 (732.8), falling .85 inch in eleven hours. By the morning of the 7th the storm-centre was near N. 41°, W. 60°, where the pressure was below 28.5 (723.9); heavy nw. gales prevailed over the region from the United States coast north of Cape Hatteras eastward to the sixtieth meridian, while equally strong gales from s. and se. occurred over the region to the eastward.

The following are the lowest barometer readings reported on the 7th: s. s. "France" W. Pearce, commanding, at 5 a. m. of the 7th, in N. 41° 20′, W. 61° 59′, barometer, 28.2 (716.3), wind ese. backing to ne., n., and nnw., blowing throughout with hurricane force; s. s. "Lake Huron" W. Bernson, commanding, at 9 p. m. on the 7th, in N. 44° 00′, W. 53° 00′, barometer, 28.2 (716.3), wind from sw. to n., ne., and e., force 10, afterwards moderating to force 9; s. s. "Illinois," Captain Dodge commanding, during the 7th and 8th, between N. 43° 35′, W. 56° 42′ and N. 42° 7′, W. 57° 30′, barometer 29.39 (721.1), wind from se. to w., hurricane force; s. s. "Devon," Captain Lobbett, commander, reported: a gale set in from ese. at 6 p. m. on the 6th, backed to nnw. at midnight, and ended at noon of the 7th., from nw.; the lowest barometer was 28.63 (727.2), at 11 p. m. on the 6th, in N. 41°, W. 65°; s. s. "Siberian," R. P. Moore, commanding, 7th, 11 a. m., in N. 43°, W. 60°, barometer (lowest) 28.6 (726.4), wind se. to ne., blowing with hurricane force.

On the 8th the region of least pressure was over the Banks, and during that and the following days, strong s., shifting to w. gales were reported between N. 40° and 45° and from W. 60° eastward to W. 40° with s. winds between W. 40° and 30° and N. 45° and 50°; within the above-mentioned region, the atmospheric pressure ranged from 29.0 (736.6) to 29.3 (744.2). During the 10th, this disturbance moved northeastward beyond the range of the observations.

6.—This depression appeared on the 13th in the region south of N. 45° and between W. 30° and 40°; during the 12th the winds shifted to e. over the ocean to the northward, with falling barometer. At 5 p. m. of the 13th the s. s. "Waesland," J. Uberweg, commanding, had barometer 29.56 (750.8), wind ne., force 6, shifting to nnw. and attaining force 10. During the 14th and 15th the disturbance apparently moved northeastward, with barometer about 29.6 (751.8) and wind shifting from ene. to e. and attaining the force of a whole gale. On the last-mentioned date the region of least pressure was off the southwest coast of Ireland, while the area of low readings appeared to extend in a southwesterly direction towards the Azores.

7.—This was a continuation of the depression described under "Areas of low barometer" as number vi. It appeared near the coast of Florida on the 14th, and moved northeastward, attended by moderate to strong gales from s. to n. and ne. At 11 p. m. on the 14th, the s. s. "Orinoco," in N. 39° 13′, W. 72° 28′, had barometer 29.52 (749.8), strong ene. gale, with rain, hail, and snow. On the 15th the centre of disturbance was near N. 40°, W. 63°, with pressure about 29.1 (739.0), and accompanied by strong e. backing to n. gales, with snow and sleet. By the morning of the 16th the disturbance had apparently passed eastward to about the forty-seventh meridian, where a decrease of pressure had occurred while an increase had set in over the region to the westward of the fifty-fifth meridian. Moderate to strong e. winds prevailed between N. 42° and 50° and W. 50° and 30°, with the pressure ranging from 29.35 (745.5) to 29.7 (754.4).

During the 17th and 18th, the disturbance occupied the ocean between N. 40° and 45°, and W. 40° and 25°, and probably passed near the Azores, but the reports from that region are not sufficiently numerous to determine its track. During the dates mentioned the barometer ranged from 29.4 (746.7) to 29.7 (754.4).

8.—This was a continuation of low-area viii.; it was central off the southern coast of Newfoundland on the morning of the 8th, causing moderate to strong w. gales between N. 40° and 45° and W. 60° and 50°; the lowest pressure reported was 29.42 (747.3), in N. 42° 06′, W. 55° 12′, with wind shifting from sw. to wnw. During the 19th and 20th the depression moved northeastward, attended by steadily decreasing pressure and moderate gales. On the 20th the pressure had fallen below 29.0 (736.6), and the winds between W. 20° and 35° increased to strong gales from s. to sw. and w. On the 21st the region of least pressure was situated near W. 20°, where the barometer now read 28.8 (731.5), and s. and sw. gales prevailed over the ocean to the westward of the British Isles. The s. s. "Spain," J. Sumner, commanding, reported barometer 28.65 (753.1) at 2 p. m. of the 21st, in N. 51° 38′, W. 21° 5′, with heavy gale from ssw. to w.; the s. s. "Amaryllis," W. W. Black, commanding, in N. 54°, W. 18°, at 11 p. m. on the 21st, had barometer 28.8 (731.5), whole gale from se. to sw. and w. During the 21st the disturbance moved northeastward to the northwestern coasts of the British Isles.

9.—On the 21st, falling barometer and the shifting of the winds to the eastward indicated the presence of a barometric depression near N. 40° and between W. 55° and 60°. On that date the lowest reported pressure was 29.11 (739.4) in N. 43° W. 54°; strong breezes to moderate gales from e. were reported to the northward while fresh nnw. and nw. gales prevailed to the westward of the low area. By the 22d the disturbance had reached N. 45°, W. 40° where the pressure had now fallen below 28.9 (734.0); the s. s. "Leerdam," P. Stierendregt, commanding, reported barometer 28.6 (728.2), at 4 p. m., on the 22d, in N. 47° 25′, W. 36° 30′, with heavy gales from se. to sw; the s. s. "Nessmore," J. Inch, commanding, at 2 a. m. on the 22d, had a terrific w. gale with heavy squalls of snow, barometer 28.45 (722.6); at 4. p. m., same weather; 8 p. m., barometer 28.8 (731.5) rising, wind and sea moderating slightly; the vessel's position was between N. 45° 39′, W. 37° 46′ and N. 45° 19′, W. 39° 24′.

During the 23d and 24th the depression moved northeastward, attended by strong s. to w. gales during its passage, and on the last-mentioned date it was central between W. 20° and the British coasts. On the 23d the pressure remained below 29.0 (736.6), but it apparently exceeded that amount on the 24th. At 2 p. m. on the 23d the s. s. "Spain," J. Sumner, commanding, reported barometer 28.67 (728.2), with strong s. to w. gale, in N. 50° 20′, W. 26° 39′, and the s. s. "Nürnberg," A. Jaeger, commanding, had barometer 28.71 (729.2) at 9.30 p. m. of the 23d, with wsw. gale of force 10, in N. 49° 7′, W. 23° 0′.

10.—This disturbance apparently developed during the 23d near N. 45° and between W. 50 and 40°, and by the following day the pressure in that region had fallen below 29.0 (736.6.) The s. s. "Republic," P. J. Irving, commanding, reported that at 1 p. m. on the 24th a dark mass of clouds appeared to the southward; at 6 p. m. the wind increased to a moderate gale from ene., with drizzling rain; at 10 p. m. the wind increased to force 9, barometer fluctuating greatly; at 4 a. m. on the 25th, in N. 46° 36′ W. 39° 24′, the barometer read 28.85 (732.8), and the wind was blowing a strong gale from e., afterwards shifting to ne., and n. At 6 p. m. of the 24th, in N. 45° 30′, W. 42° 0′, the s. s. "Leerdam," P. Stierendregt, commander, had barometer 28.8 (731.5), wind e., whole gale shifting to ne., n. and nw.

On the 25th, the storm-centre was near N. 45°, W. 35°. At noon, Greenwich time, the s. s. "Westernland," W. G. Randle, commanding, in N. 45° 09′, W. 36° 08′, reported, barometer 28.67 (728.2), a strong sw. gale had prevailed throughout the night, when the wind died out at 8 a. m., leaving a high, con-

fused sea, barometer stationary; at 11 a. m. the wind suddenly burst out from n. veering to nne. and accompanied by violent squalls of rain and hail; at 4 p. m. the weather moderated slightly. The following observations for the 25th were furnished by Captain Jaeger, commanding the s. s. "Nürnberg."

Hour.	Position.		Barometer (corrected.)		Wind.		Remarks.
	Lat. N.	Long. W	Inches.	Mill.	Direction.	Force 0–10	
a. m.	° ′	° ′					
6.30	47 7	30 5	28.88	733.5	ssw.	6	Rain squalls; dangerous sea.
8.30	47 7	31 0	28.90	734.0	sw.	4–6	
p. m.							
2.30	47 7	31 9	28.78	731.0	sw.	6–7	Fair; high cross sea.
6.30	47 5	32 8	28.66	728.0	calm		Very heavy sky; dangerous sea.
7.30	47.4	33 0	28.65 (minimum.)	727.7	nne.	3–5	High sea from all directions; heavy bank of clouds in s. and sw.; clearing in nne.
8.30			28.69	728.7	nnw.	5	
10.45	47 1	33 6	28.77	730.7	nnw.	6	Clearing.
Midnight	46 8	34 0	28.98	736.1	nnw.	6–8	Heavy rain squalls; very rough sea.

On the 26th the storm-centre was near N. 50°, W. 22°; the lowest reported barometer at the simultaneous observation being 28.85 (732.8), wind e., light, while moderate s. to sw. gales occurred to the eastward of the centre. At 4 a. m. of the 26th the s. s. "Pennland," in N. 47° 50′, W. 25° 50′, reported barometer 28.75 (730.2), strong gale from sw. shifting to s., sse., and again to sw. The s. s. "Bohemia," in N. 46° 0′, W. 33° 20′, had barometer down to 28.77 (730.7), with moderate breeze from sw. and w.; the s. s. "Scythia," Captain Whealan, also reported only strong breeze with this depression, although the barometer fell to 28.9 (734.0); vessel's position between N. 49° 26′, W. 26° 47′ and N. 47° 54′, W. 34° 33′. By the 27th this depression had advanced to the British coasts, but the pressure had increased to 29.0 (736.6).

11.—This depression appeared between N. 45° and 50° and W. 35° and 40° on the 27th, and displayed great energy during its progress. The storm-centre passed near to the steamers "Canada" and "Venetian" on the 27th; Captain G. de Kersabiec, commanding the "Canada," reported barometer 28.39 (721.1), at 9 a. m., in N. 46° 45′, W. 41° 05′, calm, or light breeze; the wind then suddenly shifted from s. to se., ese., ne. and wnw., blowing with hurricane force. Captain Trant, commanding the s. s. "Venetian," reported as follows: 27th, 4 a. m., ese. gale, increasing; 8 a. m., hard gale, se., rain, squally; slowed engines and hove to; 8.30 a. m., same wind, sky breaking; 9.30 a. m., moderate wind, high sea; 10.30 a. m., moderate, frequent lulls (in vortex for one hour, in about N. 46° W. 39°); 11 a. m., gale commenced with great fury from sw., with heavy rain and mist, barometer 28.44 (722.4); 11.30 a. m., violent hurricane, barometer 28.5 (723.9), atmosphere thick with rain and foam; impossible to see more than fifty yards in any direction; noon, same weather; 3.30 p. m., hurricane continues with high sea; vessel run before the sea under bare poles; 6 p. m., moderating slightly, barometer 28.94 (735.1). As the "Venetian" appears to have moved eastward with the depression, but to the southward of it, she experienced a continuation of more or less stormy weather, with gales from w. and wnw. during the 28th. The steamers "Scythia," "Hanoverian," "Bohemia," "Pennland," and "State of Indiana," encountered this disturbance during the 27th, between W. 35° and 45°, and had barometer ranging from 28.6 (726.4) to 29.2 (741.7), with very heavy gales from sw. to wnw. On the 28th the centre of disturbance was apparently between W. 20° and 25°, and near N. 50°, attended by strong w. gales to the southward, and between W. 25° and 40°.

On February 18th a very heavy squall, which caused considerable damage to shipping, occurred in the vicinity of Cardenas, Cuba, W. I. The following reports relating thereto have been received: Captain Darrah, commanding the brig "Mary Fink," off Cardenas, reported, "18th, 5.54 p. m, barometer 29.98 (76.15), a squall of hurricane-like force, lasting 45 minutes, occurred, the wind veering from s. to nw. very suddenly and without any warning whatever; lost and split several sails; Cay Piedros bore about ssw., 10 miles distant, when the squall struck us; the rain came down in torrents, and the force of the wind threw the vessel on her beam ends. The whole fleet of vessels at anchor in Cardenas inner roads dragged their anchors, with full scope of chain and both anchors out; and a number of lighters were sunk or driven ashore. In the inner harbor the wind was more northerly than with us."

Captain W. M. Lank, commanding the schooner "Mary Nowell," reported, "18th, ten miles east of Moro Castle, experienced a violent squall, lasting two hours and accompanied by heavy thunder and sharp lightning; the wind was from nnw. and backed to ne.; rain fell in torrents."

OCEAN ICE.

On chart i. are also exhibited the eastern and southern limits of the region within which icebergs have been observed during February, 1885. These limits are determined from reports furnished by shipmasters and from trustworthy data published in the "New York Maritime Register," and other newspapers.

During this month the eastern limit of icebergs reached 42° W. longitude in about 47° N. latitude; from that point the outer edge of the ice-region extended in a southwesterly direction to about latitude 42° N., longitude 51° W., and thence west-northwestward along the forty-third parallel to Nova Scotia and the coast of Maine. The southernmost iceberg was observed in N. 41° 50′, W. 51° 10′.

The area of the ice-region during February, 1885, was somewhat greater than in the same month of the years 1882, 1883, and 1884, as shown by the following:

Southern limit.			Eastern limit.		
Date.	Lat. N.	Lon. W.	Date.	Lat. N.	Lon. W.
	° ′	° ′		° ′	° ′
February, 1882	45 19	49 48	February, 1882	47 40	43 28
February, 1883	43 01	52 46	February, 1883	46 19	45 44
February, 1884	43 00	50 00	February, 1884	46 50	43 45
February, 1885	41 50	51 10	February, 1885	47 52	42 00

Field-ice was generally reported in the region from N. 44°, W. 49° northeastward to N. 47°, W. 46°.

Icebergs and field-ice were reported as follows:

February 1st.—The s. s. "Thingvalla," between N. 49° 5′, W. 44° 0′, and N. 47° 20′, W. 46° 5′, passed twenty-five large and many small icebergs; also passed large pieces of field-ice from N. 46° 50′, W. 46° 35′ to N. 46° 28′, W. 46° 45′. The s. s. "Helvetia," in N. 47° 01′, W. 44° 23′, passed an iceberg at 10 p. m. The s. s. "Ethiopia," in N. 47° 16′, W. 46° 30′, passed a large field of ice, taking three hours to clear it; in N. 46° 28′, W. 48° 09′, saw a large iceberg.

2d.—The s. s. "Helvetia" from 9.45 a. m. till noon, saw a continuous field of ice four or five miles to the northward; position at noon, N. 46° 07′, W. 47° 24′.

3d.—S. S. "France," between N. 45° 52′, W. 47° 28′, and N. 45° 45′, W. 47° 40′, passed field-ice extending northward as far as could be seen from the topsail yard.

4th.—S. S. "Habsburg," from N. 45° 35′, W. 48° 12′ to N. 45° 37′, W. 48° 04′, passed several large fields of ice; temperature of water 24°.8 Fahr.; temperature of the air, 26°.6 Fahr. S. S. "Pennland" in N. 46° 06′, W. 47° 55′, passed through a large ice-field.

5th.—S. S. "Illinois," in N. 47° 05′, W. 43° 47′, passed a large iceberg. The s. s. "Lake Huron," between N. 47° 52′, W. 42° 00′ and N. 46° 00′, W. 47° 30′ passed numerous large and small icebergs, also a great quantity of field-ice to the northward of the last position on the 6th; kept ship away 20 miles to the southward to clear it. The s. s. "Pennland," in N. 46° 52′, W. 43° 15′, passed two sunken icebergs surrounded by heavy breakers.

6th.—S. S. "Furnessia," between N. 48°, W. 44° 18′, and N. 46° 48′, W. 45° 53′, from 2 a. m. till noon, passed ten ice-

bergs; s. s. "Palestine," in N. 45° 41′, W. 47° 42′, at 5 p. m., passed a large iceberg, also passed some field-ice and two small bergs at 3 p. m.

7th.—S. S. "Newfoundland," at Halifax, Nova Scotia, reports very heavy field-ice in N. 45° 20′, W. 59° 40′, (special bulletin, New York Maritime Association). The s. s. "Rhaetia," in N. 47° 09′, W. 43° 23′, passed an iceberg; in N. 46° 36′, W. 45° 54′, passed two bergs; also from N. 46° 24′, W. 46° 12′ to N. 45° 52′, W. 48° 7′, passed through a large field of drift ice extending as far northward as the eye could reach.

The British s. s. "Ripon City," Jenkins, commanding, from New York, February 1, for Newcastle, England, put into Halifax, February 16, damaged by ice. Captain Jenkins reports, on the 7th they met ice, and same evening sailed right into an open bay in an immense field. By 11 p. m., it had become impossible to force their way any further, and at about midnight the plates on both sides of the bow, near the water-line, were cracked and damaged. The steamer's position at the time was about N. 45° 30′, W. 48°. When day broke the ice had closed in all around her, and as far as the eye could reach nothing was visible but a vast field of ice, with here and there an immense berg, the tips towering hundreds of feet above the surface. North of latitude 45° seemed to be a solid field of ice. For four days the steamer was wedged in solid ice. ("New York Maritime Register, February 18, 1885.")

8th.—S. S. "England," in N. 47° 15′, W. 42° 31′, at 4 p. m., passed an iceberg; s. s. "Rhaetia," in N. 45° 38′, W. 48° 52′, passed eight large and small icebergs; some were about two hundred feet high and 1,000 feet long.

9th.—S. S. "England," in N. 46° 10′, W. 46° 0′, passed an iceberg.

10th.—Bark "St. Olaves," after being in the ice for several days off Cape Enrage, returned to St. John, New Brunswick, having sustained damage. S. S. "Salier," in N. 46° 15′, W. 44° 8′, passed a small iceberg.

11th.—Captain Parry of the s. s. "Bulgarian," reported: "In N. 47° 0′, W. 46′ 0′, sighted three large icebergs ranging from three hundred to four hundred feet high, with four smaller bergs near; 8.40 p. m. came to field-ice in N. 46° 26′, W. 47° 34′; steered on the outer or east side for fourteen miles, then put ship on her course; field-ice not very thick. At 2 a. m. of the 12th, the field-ice became thick; at 5.30 a. m. got clear of field-ice in N. 45° 38′, W. 48° 30′, the western edge being very solid. From 7 a. m. to noon on the 12th, in N. 44° 59′, W. 50° 12′, passed between very large icebergs, four to the southward and three to the northward; the distance across the ice-field was sixty-one miles. I should recommend all steamers to keep well south as the ice-field was evidently setting to the southward."

The s. s. "Salier," from N. 45° 27′, W. 48° 23′, to N. 45° 24′, W. 48° 29′, passed field-ice; in N. 45° 22′, W. 48° 31′, passed an iceberg, and in N. 45° 20′, W. 48° 39′, field-ice; in N. 45° 13′, W. 48° 50′, an iceberg.

12th.—S. S. "Boston City," in N. 48° 47′, W. 48° 15′, saw an iceberg to the northward, also encountered large fields of ice.

13th.—S. S. "Boston City," in N. 47° 43′, W. 48° 40′ met solid ice-fields; s. s. "Nederland," between N. 47° 16′, W. 45° 22′, and N. 45° 45′, W. 47° 47′, passed twelve or thirteen icebergs, also sighted large quantities of field-ice. The s. s. "Bristol," between N. 46° 25′, W. 47° 08′, and N. 45° 10′, W. 49° 58′ passed large quantities of field-ice and several icebergs; s. s. "Caspian," in N. 43° 25′, W. 48° 40′, passed two small icebergs.

14th.—S. S. "Norseman," in N. 44° 0′, W. 53° 0′, at 1 p. m., passed a large iceberg, also passed several between 9 and 11 p. m.; s. s. "Nederland," in N. 44° 40′, W. 48° 54′, sighted field-ice; s. s. "Serpho," in N. 44° 0′, W. 62° 55′, passed field-ice; s. s. "Nestorian," in N. 43°, W. 49° passed three large bergs; s. s. "Wyoming," between N. 43° 31′, W. 48° 37′ and N. 43° 06′, W. 49° 48′, between 10 a. m., and 2 p. m., passed four icebergs; (also reported by s. s. "Bothnia.") The s. s. "Moravia," between N. 46° 32′, W. 46° 50′ and N. 45° 5′, W. 47° 48′, passed several icebergs and large ice-fields; at noon the ship's position was N. 44° 48′, W. 48° 29′ and from then till 3 p. m. eight large icebergs were seen.

15th.—S. S. "Canada," in N. 44° 58′, W. 47° 0′ passed a large iceberg, also two others in N. 44° 30′, W. 47° 55′; a large piece of field-ice was seen in N. 43° 43′, W. 49° 30′; s. s. "Boston City," 9 a. m., in N. 43° 40′, W. 50° 42′, passed a large iceberg.

16th.—S. S. "Assyrian Monarch," 8 p. m., in N. 46° 20′, W. 47° 30′ fell in with field-ice; temperature of air, 28°; water, 28°; steered to the southwestward until 6 p. m. of February 17th, passing immense fields of floating ice and numerous very large icebergs. To the westward, on the Banks, the field-ice appeared to be solid and heavy; ship put on proper course to the westward, in N. 42° 45′, W. 50° 40′. The s. s. "Edam," in 45° 00′, W. 45° 30′, at 7.30 a. m., passed an iceberg; s. s. "Main," 1.30 p. m. in N. 44° 47′, W. 45° 45′, passed an iceberg; s. s. "Troqueer," in N. 45° 50′, W. 45° 19′, passed an iceberg and a few minutes later some field-ice.

17th.—S. S. "Britannic," in N. 45° 30′, W. 45° 10′, 2 p. m. passed three icebergs; s. s. "Main," in N. 43° 31′, W. 49° 13′ 1 a. m., passed three icebergs; s. s. "Jan Breydel," at 1 a. m. fell in with fields of ice which lasted from N. 44° 44′, W. 48° 21′ to twenty miles south-southwestward.

18th.—S. S. "Caledonia," in N. 41° 52′, W. 51° 0′ passed several icebergs; s. s. "City of Montreal," in N. 43° 6′, W. 48° 50′ at 8 a. m. passed an iceberg, also between N. 42° 48′, W. 49° 45′ and N. 42° 15′, W. 50° 18′ passed a group of five icebergs; s. s. "Geiser," in N. 45° 4′, W. 47° 0′ at 7 a. m. passed some small pieces of ice; between N. 44° 12′, W. 48° 28′ and N. 43° 39′, W. 48° 33′ from 2 to 6 p. m., passed several icebergs and extensive fields of pack-ice; steered southward to avoid them. The s. s. "Britannic," in N. 43° 00′, W. 49° 15′ at 5 a. m., passed one iceberg and a quantity of field-ice; N. 42° 51′, W. 50° 3′ at 9 a. m. passed two icebergs; N. 42° 37′, W. 50° 45′ passed one iceberg; s. s. "America," in N. 43° 20′, W. 49° 30′, passed a large iceberg five miles to the southward and saw several small bergs; from 10.30 a. m. till noon passed through drift-ice; to the northward and southward, streaks of field-ice a mile in width, were in sight. The s. s. "Sussex," in N. 45° 30′, W. 48° 00′, at 7.45 a. m. struck a large cake of ice and stove bows, also passed loose ice in N. 44° 10′, W. 49° 0′.

19th.—S. S. "Aurania," in N. 44° 23′, W. 45° 36′, passed an iceberg; s. s. "Serpho" passed large quantities of field-ice just outside of Boston harbor; s. s. "Lepanto," between N. 42° 10′, W. 50° 10′, and N. 42° 1′, W. 50° 30′, passed several icebergs.

20th.—S. S. "Grecian," in N. 42° 36′, W. 50° 47′, at 7.30 a. m., passed three large icebergs; s. s. "Devonia," in N. 44° 45′, W. 45° 6′, at 1 p. m., passed an iceberg to the southward of the vessel.

21st.—S. S. "Greece," in N. 44° 38′, W. 44° 37′, passed an iceberg; s. s. "Virginian," in N. 46° 8′, W. 46° 59′, at 5.45 p. m., saw some field-ice; s. s. "Saint Germain," in N. 45° 4′, W. 57° 58′, at 10 a. m., passed an iceberg. The s. s. "Devonia," between N. 43° 21′, W. 48° 48′, and N. 43° 10′, W. 49° 50′, passed several icebergs; s. s. "Gallia," in N. 42° 2′, W. 50° 8′, passed an iceberg; s. s. "Westphalia," in N. 45° 2′, W. 47° 18′, passed an iceberg eighty feet high; saw some field-ice in N. 44° 40′, W. 48° 29′, also passed an iceberg about one hundred and twenty feet high in N. 44° 38′, W. 48° 52′.

22d.—S. S. "Virginia," saw several icebergs to the southward at 10 a. m.; noon, passed a number of small bergs and several large ones in N. 43° 52′, W. 48° 0′; between 1.30 and 3.30 p. m., passed six large and several small icebergs. The s. s. "Missouri," in N. 44° 0′, W. 48° 10′, passed three icebergs from 10 to 11.30 a. m., also two smaller bergs about noon; 1 p. m., passed five miles south of two icebergs, and at 2 p. m. five miles north of several small bergs; s. s. "St. Germain," in N. 42° 50′, W. 52° 10′, at 10 a. m. passed an iceberg; also in N. 42° 30′, W. 53° 45′, at 3 p. m. passed another; the first was about seventy-five feet high and 1,300 feet long, and the second about one hundred and fifteen feet high and 1,300 feet long; s. s. "St. Laurent," between N. 43° 47′, W. 48° 25′ and N. 44° 32′, to 45° 37′, passed ten icebergs.

23d.—S. S. "Europa," in N. 44° 24′, W. 45° 12′ passed a large iceberg; s. s. "Greece," between N. 43° 0′, W. 48° 50′, and N. 42° 30′, W. 51° 3′, from 6 a. m. to 6 p. m., passed nine icebergs, some of which were very large.

24th.—Bark "Olbers," in N. 50° 36′, W. 42° 22′, passed an iceberg one hundred feet high.

25th.—S. S. "Nessmore," between the parallels of N. 42° 50′ and N. 42° 10′, and the meridians of 49° W. and 51° W., passed six icebergs, two of which were of very large dimensions.

26th.—S. S. "Tower Hill, in N. 43° 7′, W. 49° 10′ passed an iceberg; s. s. "Leerdam," in N. 42° 15′, W. 51° 15′, 5 p. m., passed several icebergs; s. s. "Republic," in N. 43° 40′, W. 47° 53′, at 8.30 a. m., passed a large iceberg about two hundred feet high; by 10 a. m. we had passed the last of nine others, scattered about north and south of the ship's course; at noon, in N. 43° 29′, W. 49° 4′, passed a quantity of broken field-ice. The s. s. "Neckar," in N. 42° 27′, W. 49° 28′, at 7.30 a. m. passed an iceberg about seventy feet high and 1,500 feet long; 10.30 a. m., in N. 42° 19′, W. 50° 25′, passed a large iceberg; 5.45 p. m., in N. 42° 6′, W. 52° 17′, passed another.

27th.—S. S. "Oder," at Bremen, reported having passed several icebergs in N. 41° 50′, W. 51° 10′.

28th.—S. S. "Martello," in N. 42° 40′, W. 50° 0′, at 8 a. m., passed eight large icebergs; s. s. "Spain," between N. 44° 0′, W. 48° 0′ and N. 43° 13′, W. 49° 10′, passed four icebergs and a quantity of loose field-ice.

The following is taken from the advance sheets of the "International Nautical Magazine," published in New York:

HALIFAX, N. S., *February* 23, 1885.

To the publishers International Nautical Magazine:

DEAR SIRS: The ice north of Sable Island, which comes out of the Gulf of Saint Lawrence, extends at present nearly from the Banks of Saint Peters to past the Straits of Canso and northward into the gulf.

On the previous voyage we passed through over one hundred miles of very heavy ice from latitude 45° 35′, longitude 57° 20′, to latitude 45° 20′, longitude 59° 40′, and we were jammed in it for twenty hours.

This voyage I took a more southerly course, and keeping south of latitude 45° 17′, I passed through the southern edge of the ice, running through about eighty miles each way.

I have not, during the twelve winters I have run the mails to Newfoundland found such heavy ice so early in the localities mentioned until this season. The temperature of the water seems to be lower this spring than in many former years, and the ocean seems to be one congealed mass.

The Banks, south of Newfoundland and towards the coast of Nova Scotia, are full of what we term *slob* ice, and the sea from Cape Race to Belle Isle is full of heavy ice and icebergs.

I was this time detained two days, twelve hours through the ice blockade on the coast, and according to all accounts from incoming Dundee sealing steamers and other observations, *I firmly believe this will be a trying spring for ocean steamers and vessels in the north Atlantic trade.* It has been reported to me by the above-mentioned sealing steamers that the icebergs were uncountable.

Yours, respectfully,

CHARLES MYLIUS,
Master, Mail Steamer "Newfoundland."

SIGNAL SERVICE AGENCIES.

Signal Service Agencies have been established in the Maritime Exchange Buildings at New York and Philadelphia, and in the Custom House at Boston, where the necessary blanks and other information will be furnished to ship-masters. In the January REVIEW was published an explanation of the object of these agencies.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were, during February, 1885, ten reports cabled to that office, concerning storms and icebergs encountered by vessels on the Atlantic west of the forty-fifth meridian. Three messages were sent from Boston.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for February, 1885, is exhibited on chart ii. by the dotted isothermal lines; and in the table of miscellaneous data are given the means for the various stations of the Signal Service.

In the following table are given the mean temperatures for the several geographical districts with the normals and departures, as deduced from the Signal Service observations:

Average temperatures for February, 1885.

Districts.	Average for Feb. Signal-Service observations.		Comparison of Feb., 1885, with the average for several years.
	For several years.	For 1885.	
	°	°	°
New England	28.6	20.4	− 8.2
Middle Atlantic states	36.3	27.7	− 8.6
South Atlantic states	50.6	43.8	− 6.8
Florida peninsula	64.2	59.1	− 5.1
Eastern Gulf states	53.4	46.0	− 7.4
Western Gulf states	52.8	46.5	− 6.3
Rio Grande valley	63.0	56.5	− 6.5
Tennessee	45.3	36.9	− 8.4
Ohio valley	36.8	24.8	−12.0
Lower lake region	28.0	16.0	−12.0
Upper lake region	21.0	9.4	−11.6
Extreme northwest	9.8	2.9	− 6.9
Upper Mississippi valley	29.3	18.1	−11.2
Missouri valley	22.3	14.0	− 8.3
Northern slope	21.3	22.7	+ 1.4
Middle slope	31.5	27.6	− 3.9
Southern slope	48.5	46.3	− 2.2
Southern plateau	45.7	46.5	+ 0.8
Middle plateau	32.9	38.2	+ 5.3
Northern plateau	29.2	39.2	+10.0
North Pacific coast region	40.4	36.7	+ 6.7
Middle Pacific coast region	49.8	54.0	+ 4.2
South Pacific coast region	55.5	56.7	+ 1.2
Mount Washington, N. H	6.8	0.6	− 6.2
Pike's Peak, Colo	3.6	1.9	− 1.7

The mean temperature for February, 1885, was below the normal in all parts of the United States east of the one hundred and fifth meridian. In the lake region, upper Mississippi, lower Missouri and Ohio valleys the month was unusually cold, the mean temperature averaging from 10° to 15° below the normal. In the Ohio valley and Tennessee, along the Atlantic coast south of Massachusetts, and in the Gulf states the monthly mean temperatures were, with a few exceptions, the lowest recorded since the establishment of the Signal Service stations. At Cincinnatti, Ohio, and Nashville, Tennessee, the mean temperatures for February, 1885, were 4°.2 and 4°.8, respectively, below that for February, 1875, which, in the northern districts east of the Rocky mountains, was the coldest February that has occurred since the Signal Service stations were established.

In the Rocky mountain districts and on the Pacific coast February, 1885, was warmer than the average, the departures above the normal temperature averaging from 2° to 10°.

RANGES OF TEMPERATURE.

The monthly and daily ranges of temperature at the various Signal Service stations are given in the table of miscellaneous meteorological data. The monthly ranges were greatest in the extreme northwest and least along the Pacific coast, the extremes being 90°.6 at Poplar River, Montana, and 22°.5 at San Francisco, California.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for the various districts, in the table of miscellaneous data, and on chart iv. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, 32°.2, is 9°.5 below the February average for the three preceding years.

California.—Hydesville, Humboldt county: mean temperature, 50°.3, is 5°.9 above that for February, 1884, and is considerably above the average for the month for several years.

Connecticut.—Mr. W. W. Ellsworth, voluntary observer at Hartford, reports: "February was remarkable for its low mean temperature, which was 18°.0, or the lowest recorded for fifty years."

Mr. L. Andrews, at Southington reports: "Without exception this has been the coldest February for the last thirty

years; the next coldest February was that of 1875, the temperature being 18°.4, or 0°.9 above that for the present year."

Dakota.—Webster, Day county: mean temperature, 6°.8, is 1°.2 above the February average for the two preceding years.

Georgia.—Milledgeville, Baldwin county: mean temperature, 42°.4, is below the February normal; the coldest weather of the winter occurred on the 11th and 12th.

Illinois.—Mattoon, Coles county: mean temperature, 18°.3, is 15°.4 below the February average for the last five years.

Sycamore, DeKalb county: mean temperature, 8°.7, is the lowest recorded during the last four years.

Riley, McHenry county: mean temperature, 7°.7, is 14°.9 below the February average for the last twenty-four years, and is, with the exception of February, 1875, the lowest for that period.

Anna, Union county: mean temperature, 28°.0, is 11°.2 below the February average for the last ten years.

Swanwick, Perry county: mean temperature, 22°.2, is 14°.4 below the February average for the last three years.

Table of comparative minimum temperatures for the month of February.

State or Territory.	Minimum for February, 1885, Signal Service.		Minimum since Signal-Service stations were opened—3 to 14 years.			Lowest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
		°		°			°		Years.
Alabama	Montgomery	15.5	Montgomery	22	1875	Huntsville	−7		9
Do	Mobile	24.0	Mobile	28	1875, 1876	Mount Vernon Arsenal	13		32
Arizona	Prescott	14.3	Prescott	−11	1880	Fort Canby (old)	−12		12
Do	Fort Grant	25.3	Fort Grant	17	1883	Camp Grant	16		13
Arkansas	Fort Smith	1.0	Fort Smith	8	1883	Fort Smith	−4	1840	22
Do	Little Rock	10.2	Little Rock	22	1881, 1883	Washington (near)	6		28
California	San Francisco	46.5	San Francisco	35	1883	Fort Bidwell	−18	1868	19
Do	Sacramento	39.8	Sacramento	22	1883	Sacramento	31		17
Colorado	Denver	0.2	Denver	−20	1881	Fort Garland	−23		30
Do	Pike's Peak	−24.0	Pike's Peak	−37	1875	Fort Lewis	−30	1880	1
Connecticut	New London	2.0	New London	−3	1873	Colebrook	−28	1861	14
Do	New Haven	−1.6	New Haven	−4	1881	New Haven	−16		86
Dakota	Fort Buford	−32.0	Fort Buford	−40	1883, 1884	Fort Abercrombie	−40	1861, 1869	16
Do	Yankton	−18.2	Yankton	−23	1881, 1884	Fort Pembina	−45	1875	7
Delaware	Delaware Breakwater	9.0	Delaware Breakwater	7	1881	Dover	−3	1875	6
Do						Fort Delaware	0		45
District of Columbia	Washington City	3.4	Washington City	−1.5	1875	Washington City	−5		49
Florida	Pensacola	24.0	Pensacola	31	1881	Fort Barrancas	11		58
Do	Key West	55.6	Key West	55	1877, 1878	Key West	45		44
Georgia	Augusta	14.7	Augusta	22	1875	Augusta Arsenal	−2	1835	51
Do	Savannah	22.5	Savannah	29	'75 '76 '81	Savannah	32		37
Idaho	Boisé City	13.2	Boisé City	−5	1882	Fort Hall	−13	1880	15
Do	Lewiston	23.0	Lewiston	−13.5	1883	Fort Boisé	−10		11
Illinois	Chicago	−13.7	Chicago	−13	1875	Belvidere	−31.5	1875	5
Do	Cairo	0.6	Cairo	4	1875	Winnebago	−26		11
Indiana	Indianapolis	−9.0	Indianapolis	−8	1875	Spiceland	−21	1866	14
Do	Greencastle	−13.1				Vevay	−10	1867	21
Indian Territory	Fort Supply	1.0	Fort Sill	7	1881	Fort Arbuckle	−4	1856, 1857	20
Do			Fort Gibson	5	1875	Fort Gibson	−12		49
Iowa	Dubuque	−20.0	Dubuque	−31	1875	Guttenburg	−37	1868	11
Do	Davenport	−17.3	Davenport	−16	1875	Brookside	−35	1868	5
Kansas	Leavenworth	−16.2	Leavenworth	−12	1883	Fort Leavenworth	−26		50
Do	Dodge City	−5.2	Dodge City	−20	1883	Fort Riley	−18		22
Kentucky	Louisville	−1.3	Louisville	0	1875	Newport Barracks	−20		29
Louisiana	Shreveport	14.6	Shreveport	19	1884	Fort Jesup	7		23
Do	New Orleans	30.0	New Orleans	32.5	1875	New Orleans	26		51
Maine	Eastport	−10.6	Eastport	−20	1876	Brunswick	−28		53
Do	Portland	−4.8	Portland	−7	1874, 1876	Portland	−24	1826	37
Maryland	Baltimore	3.4	Baltimore	2	1873	Fort McHenry	−6	1875	50
Do	Ocean City	7.2				Deer Park	−10	1881	1
Massachusetts	Boston	0.8	Boston	−6.5	1870	Williamstown	−26		61
Do	Thatcher's Island	−1.3	Thatcher's Island	9	1876	Lunenburg	−26		24
Michigan	Escanaba	−25.0	Escanaba	−32	1875	Fort Brady	−55	1875	59
Do	Detroit	−11.6	Detroit	−20	1875	Detroit	−14		35
Minnesota	Saint Vincent	−39.2	Saint Vincent	−38	1883	Fort Ripley	−43		18
Do	Saint Paul	−24.5	Saint Paul	−32	1875	Fort Snelling	−35		55
Mississippi	Vicksburg	17.2	Vicksburg	21	1875	Columbus	14		10
Missouri	Saint Louis	−5.5	Saint Louis	−3	1875	Saint Louis	−25	1835	44
Montana	Fort Assinaboine	−16.7	Fort Assinaboine	−47	1883	Fort Ellis	−53	1872	13
Do	Fort Benton	−20.8	Fort Benton	−41	1883	Camp Baker	−43		4
Nebraska	Omaha	−17.9	Omaha	−24.9	1883	Fort McPherson	−24	1874	13
Do	North Platte	−22.2	North Platte	−29	1883	Camp Sheridan	−29	1881	5
Nevada	Winnemucca	10.3	Winnemucca	−17	1882	Fort Ruby	−19		6
New Hampshire	Mount Washington	−30.8	Mount Washington	−42	1876	Stratford	−37	1861	11
New Jersey	Sandy Hook	1.5	Sandy Hook	0	1881	Newark	−7	1861	14
Do	Atlantic City	−5.0	Atlantic City	−5	1875	Paterson	−5		6
New Mexico	Santa Fé	3.0	Santa Fé	−3	1879, 1880	Santa Fé	−2		25
Do	Lava	12.0				Fort Union	−21	1881	29
New York	Buffalo	−12.8	Buffalo	−13	1875	Sackett's Harbor	46	1861	8
Do	Albany	−10.0	Albany	−18	1875	Albany	−16		55
North Carolina	Charlotte	12.0	Charlotte	18	1884	Fort Johnson	3		58
Do	Fort Macon	18.3	Fort Macon	20	1881	Fort Macon	20		16
Ohio	Cincinnati	−9.0	Cincinnati	−1	1875	Cincinnati	−17	1835	36
Do	Toledo	−15.5	Toledo	−12	1875	Hillsborough	−22	1835	35
Oregon	Portland	31.5	Portland	7	1883, 1884	Camp Harney	−16	1868	12
Do	Roseburg	29.4	Roseburg	3	1884	Camp Warner	−3		7
Pennsylvania	Erie	−12.3	Erie	−16	1875	Philadelphia	−2		113
Do	Pittsburg	−8.8	Pittsburg	−4	1881	Allegheny Arsenal	−22	1856	32
Rhode Island	Block Island	6.6	Newport	−2	1881	Fort Adams	−15		33
Do	Narragansett Pier	0.0	New Shoreham	2	1881	Providence	−16		35
South Carolina	Charleston	22.0	Charleston	26	1881	Charleston	22		105
Do						Fort Moultrie	6		38
Tennessee	Memphis	9.9	Memphis	13	1875	Glenwood Cottage	−4		11
Do	Nashville	−0.8	Nashville	9	1875, 1876	Humboldt	11		4
Texas	Fort Elliott	−2.3	Fort Elliott	−10	1883	Fort McKavett	8		28
Do	Fort Stockton	11.2	Fort Stockton	8	1883	Camp Stockton	15		15
Utah	Salt Lake City	21.9	Salt Lake City	−13	1884	Fort Crittenden	−6		3
Vermont			Burlington	−18	1881	Randolph	−31	1868	5
Virginia	Norfolk	14.4	Norfolk	9	1875	Fortress Monroe	4		49
Do	Lynchburg	3.7	Lynchburg	3	1875	Alexandria	3	1855	12
Washington Territory	Olympia	30.0	Olympia	8	1883	Fort Colville	−20		15
Do	Spokane Falls		Spokane Falls	−32	1884	Fort Walla Walla	−2		11
West Virginia			Morgantown	−10	1875	Helvetia	−6	1880	3
Wisconsin	La Crosse	−22.0	La Crosse	−34	1875	Fort Howard	−38	1823	31
Do	Milwaukee	−23.6	Milwaukee	−22	1875	Milwaukee	−18		11
Wyoming	Cheyenne	−12.5	Cheyenne	−26	1883, 1884	Fort Fetterman	−40	1873	6

Indiana.—Logansport, Cass county: mean temperature, 18°.1, is 11°.7 below the February average for the last twenty-six years. The mean temperature for the winter of 1884–'85 is 21°.16, or 6°.59 below the winter average for the above period.

Wabash, Wabash county: mean temperature, 15°.6, is 19°.3 below the February average for the last nine years.

Vevay, Switzerland county: mean temperature, 25°.1, is 10°.8 below the February average for a period of twenty-one years. The mean temperature for the winter of 1884-'85 is 28°.6, or 4°.7 below the winter average for the period above named.

Spiceland, Henry county: mean temperature, 17°.6, is 12°.0 below the February average for the last thirty-one years; during that period but one February was as cold as February, 1885. The mean temperature for the winter of 1884–'85 is 21°.6, or 7° below the winter mean for thirty-one years.

Sunman, Ripley county: mean temperature, 22°.0, is the lowest February mean recorded since 1843.

Iowa.—Cresco, Howard county: mean temperature, 4°.1, is the lowest February mean recorded since 1875.

Muscatine, Muscatine county: mean temperature, 10°.4, is 14°.0 below the February average for the last forty-seven years, and is the lowest for that period with the exception of 10°.2, for February, 1875.

Monticello, Jones county, Iowa: mean temperature, 8°.7, is the lowest recorded in February since 1854, with one exception, viz., 7°.5 for February, 1875. The mean temperature for the winter months (December—March) is 10°.1, or the lowest that has occurred during the period above mentioned.

Kansas.—Yates Centre, Woodson county: mean temperature, 21°.1, is 9°.8 below the February average for the last five years. The mean temperature for the winter of 1884–'85 is 20°.5, or 1°.7 below the winter average for the above period.

Lawrence, Douglas county: mean temperature, 20°.8, is 12°.1 below the February average for the last seventeen years.

Wellington, Sumner county: mean temperature, 24°.6, is considerably below the February average for the last seven years.

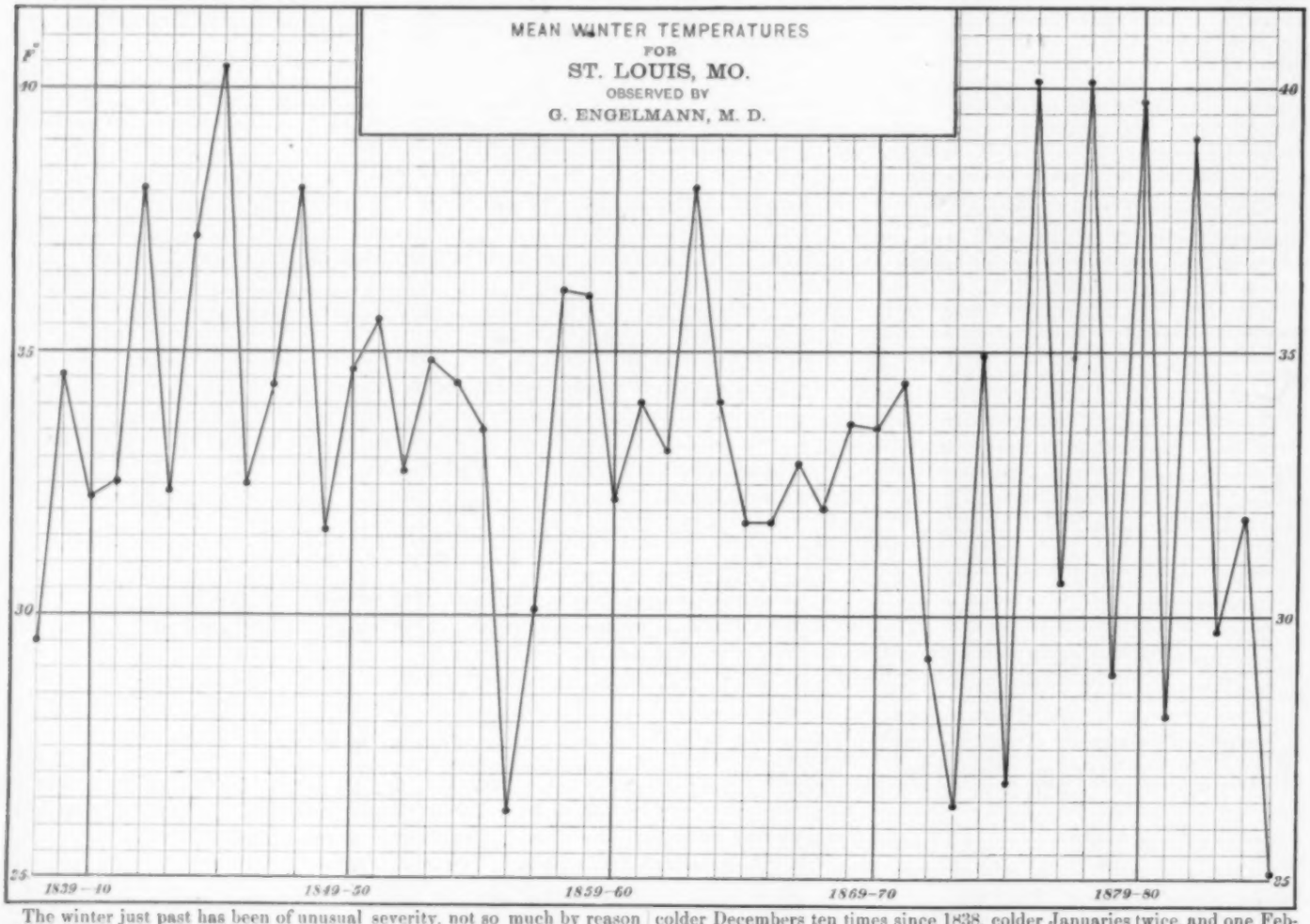
Atchison: mean temperature, 18°.7, is 10°.5 below the February average for the last twenty-one years.

Maryland.—Fallston, Harford county: mean temperature, 23°.8, is 8°.9 below the February average for the last fourteen years.

Massachusetts.—Worcester, Worcester county: mean temperature, 16°.0, is the lowest February mean recorded during the last forty-seven years; February, 1849, was the next coldest, the mean being 18°.1.

Michigan.—Thornville, Lapeer county: mean temperature, 10°.6, is 14° below the February normal.

Missouri.—The following diagram, showing the mean winter temperatures at Saint Louis, and the accompanying notes relative thereto are from the February report of "Missouri Weather Service," under the direction of Prof. F. E. Nipher:



The winter just past has been of unusual severity, not so much by reason of the very low temperatures reached as by reason of the long duration of cold weather.

The lowest temperature reached was —12°, which has often been exceeded before. December had a temperature of 29°.8, which is 3°.7 below the normal. The temperature of January was 22°.5, or 8°.9 below the normal, while February, having a mean of 23°.1, was 12° below the normal. We have had colder Decembers ten times since 1838, colder Januaries twice, and one February, that of 1837, was 2°.3 colder than the past month.

The average for the winter was 25°.1, and this is 1°.2 below any previous winter since 1837.

It would seem reasonable that an unusually cold winter should be followed by a cold and backward spring, but the observations do not aid us any in making predictions.

The coldest March on record (1843) having a temperature of 27°.4 followed a winter only 1° below the normal.

In all, three cold Marches, two of which were the coldest, have followed normal winters, one has followed a very warm winter—one of the warmest observed, one has followed a cool winter, and two a cold winter. Our two warmest Marches have followed warm winters, three other warm Marches following normal winters.

For April the same thing can be said. The coldest April on record (1857), followed a cool winter, but the previous winter, one of the coldest on record, was followed by a mild and pleasant April.

It therefore, appears that the winter temperature of Saint Louis affords no criterion for predicting the character of succeeding months.

New Hampshire.—Contoocook, Merrimac county: mean temperature, 13°.5, is about 9° below the February average.

New Jersey.—Paterson, Passaic county: February, 1885, was a remarkably cold month; the daily mean temperature was above the freezing point on but three days.

South Orange, Essex county: mean temperature, 22.°8, is the lowest recorded in February during the last fifteen years, and is 7° below the normal for the same period.

New York.—Palermo, Oswego county: mean temperature, 9°.8, is 11°.7 below the February average for the last thirty-two years, and is the lowest February mean for that period.

Cooperstown, Otsego county: mean temperature, 10°.5, is the lowest recorded for any month during the last thirty years, with the exception of January, 1857. The mean of the 7 a. m. observations is the lowest recorded for any month during the above period.

North Volney, Oswego county: mean temperature, 12°.4, is 9°.8 below the February average for the last seventeen years, and is the lowest recorded during that period. The mean temperature for the winter of 1884–'85 is 19°.6, or 3°.6 below the winter average for seventeen years.

Ohio.—Wauseon, Fulton county: mean temperature, 11°.9, is 14°.5 below the February average for the last fifteen years.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 13°.6, is 8°.9 below the February average for the last twenty-one years, and is the lowest recorded in that period.

Grampian Hills, Clearfield county: mean temperature, 13°.7, is is 9°.3 below the February average for a period of eleven years—from 1865 to 1875.

Quakertown, Bucks county: mean temperature, 19°.8, is 11°.5 below the February average for the last six years.

Vermont.—Woodstock, Windsor county: mean temperature, 6°.7, is 10° below the February average for the last eighteen years.

Virginia.—Variety Mills, Nelson county: mean temperature, 29°.6, is 10°.7 below the February average for the the last eight years, and is the lowest recorded during that period. The mean temperature for the winter of 1884–'85 is 33°.8, or 3°.5 below the winter average for eight years.

Wytheville, Wythe county: mean temperature, 30°.0, is 7° below the February average for a period of seventeen years.

Bird's Nest, Northampton county: mean temperature, 35°.0, is with one exception, the lowest recorded during the last six teen years.

West Virginia.—Helvetia, Randolph county: mean temperature, 25°.7, is 11°.1 below the February average for the last nine years.

LOW TEMPERATURES.

Fort Totten, Dakota: the daily mean temperature for the 9th was —29.°0, the lowest of the winter.

Dubuque, Iowa: the 10th was the coldest day of the winter, minimum temperature —13°.6.

Leavenworth, Kansas: the minimum temperature on the 10th, —16°.2, is the lowest of the season. Reports from the surrounding country state that the extremely cold weather has resulted in heavy loss of live stock.

New York City: on the 11th, the temperature fell to zero, being the lowest of the winter.

Chicago, Illinois: the minimum temperature,—13°.7, on the 11th, is the lowest recorded in February since the establishment of this station.

Nashville, Tennessee: on the 20th, the temperature fell to 2°, which is the lowest recorded in February for many years.

Rochester, New York: at 7 a. m. on the 11th, the temperature was —10°, and between 7 and 8 a. m., it fell to —11°, which is within 1° of the lowest previously recorded at this station, viz.: —12° on February 19th, 1875.

Moorhead, Minnesota: the 9th was the coldest day of the winter, the daily mean temperature being —25°.1, and the minimum —30°.

Columbus, Ohio: the minimum temperature on the 11th, —11°, is, with the exception of —20° on January 3d, 1879, the lowest recorded since this station was established in 1878.

Toledo, Ohio: the weather during the 10th and 11th was the coldest experienced for many years; the minimum temperature on the 11th was —15°.5; the lowest previously recorded at this station was —12°, which occurred in both January and February of 1875.

Atlanta, Georgia: the minimum temperature, 8°, on the 11th, is the lowest of the winter.

Montgomery, Alabama: the lowest temperature of the season, 15°.5, occurred on the 11th.

Buffalo, New York: on the 11th the minimum temperature was —12°.6; the lowest temperature recorded since this station was established in 1871, is —13° for February 9th, 1875.

Milwaukee, Wisconsin: the minimum temperature of the 11th was —23°.6; the lowest temperature recorded since the establishment of this station is —25° for January, 1875. The winter of 1884–'85 has been unusually severe. The mean temperature for the months of December, January, and February, is lower than that for corresponding period since the station was established. At the close of February the earth was frozen to an average depth of five feet. The officers of the water department and plumbers, state that the ground froze to a greater depth than was ever before known. The general conditions of the past winter were similar to those of the winter of 1874–'75.

Port Huron, Michigan: on the 11th the temperature fell to —25°, which is the lowest recorded here since 1864.

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—1st to 28th.

Middle Atlantic states.—1st to 28th.

South Atlantic states.—2d, 3d, 6th, 7th, 9th to 25th, 27th, 28th.

Florida.—Sanford, 3d, 7th, 12th, 17th, 20th; Cedar Keys, 20th, 21st; Saint Augustine, 7th, 17th, 20th, Archer, 2d, 3d, 7th, 11th, 12th, 20th; Mayport, 11th, 17th, 20th; Limona, 7th, 11th, 12th, 17th, 26th; Newport, 3d, 7th, 11th, 12th, 17th, 19th to 22d.

Eastern Gulf states.—2d, 3d, 6th, 7th, 10th to 24th, 26th, 27th, 28th.

Western Gulf states.—1st to 4th, 6th, 10th to 20th, 25th to 28th.

Rio Grande valley.—Rio Grande City and Brownsville, Texas, 14th.

Tennessee.—1st, 2d, 10th, 11th, 12th, 14th to 28th.

Ohio valley.—3d, 4th, 10th, 11th, 12th, 14th, 15th, 18th to 24th, 27th, 28th.

Lower lake region.—1st, 4th, 5th, 6th, 10th to 28th.

Upper lake region.—1st to 28th.

Extreme northwest.—1st to 28th.

Upper Mississippi valley.—3d, 11th to 14th; 20th to 23d, 25th to 28th.

Missouri valley.—1st to 28th.

Northern slope.—1st to 28th.

Middle slope.—1st to 4th, 7th to 28th.

Southern slope.—1st, 2d, 10th, 11th, 12th, 14th, 25th.

Southern plateau.—1st to 21st, 25th to 28th.

Middle plateau.—1st, 2d, 3d, 8th, 9th, 12th, 13th, 15th, 22d to 25th, 27th, 28th.

Northern plateau.—7th, 8th, 12th, 14th, 22d to 25th, 28th.

North Pacific coast region.—7th, 17th, 21st, 22d, 23d, 27th, 28th.
Middle Pacific coast region.—7th to 17th, 22d to 28th.
South Pacific coast region.—San Diego, California, 10th.

ICE.

Ice formed in the southern parts of the country as follows:
Arizona.—Wickenburg, 9th, 15th.
Florida.—Jacksonville, 11th.
Georgia.—Savannah, 11th, 21st; Athens, 10th to 24th; Augusta, 12th.
Louisiana.—Liberty Hill, 10th.
North Carolina.—Fort Macon, 11th, 19th, 20th, 21st; Portsmouth, 20th, 21st, 22d; Kitty Hawk, 11th, 19th, 21st, 22d; New River Inlet, 17th, 19th to 23d.
Texas.—Galveston, 10th; Indianola, 10th, 14th.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United States and Canada, for the month of February, 1885, as determined from reports from more than seven hundred stations, is exhibited on chart iii.

In the northern and middle Rocky mountain districts, the Rio Grande valley, and Florida peninsula the precipitation for February was in excess of the average, the departures being slight except in Florida peninsula where they were more than three inches above the average. The most important feature in connection with the monthly precipitation is the large area of deficiencies which, with exception of a few isolated localities, includes nearly all districts east of the Rocky mountains. The deficiencies are most marked in California, the lower lake region, upper Mississippi and Missouri valleys, Tennessee and the Gulf states. In northern California where the February average for several years is about four inches, this year it is but little more than one-half inch, and in southern California there was an almost entire absence of rain, the average for February in former years being about two and one-half inches.

Owing to large deficiencies in the February precipitation in the central valleys, and the prevalence of unusually low temperatures, which prevented a sudden melting of the winter snowfall, a repetition of the destructive floods of February, 1883 and 1884, have not occurred.

In the following table are shown, for each of the geographical districts, as deduced from Signal Service observations, the average February precipitation for a series of years; the average for February, 1885, and the departures from the normal.

Average precipitation for February, 1885.

Districts.	Average for Feb. Signal-Service observations.		Comparison of Feb., 1885, with the average for several years.
	For several years.	For 1885.	
	Inches.	*Inches*	*Inches.*
New England	4.06	3.12	−0.94
Middle Atlantic states	3.50	3.28	−0.22
South Atlantic states	3.94	3.80	−0.14
Florida peninsula	2.63	6.11	+3.48
Eastern Gulf states	5.11	3.38	−1.73
Western Gulf states	4.31	2.56	−1.75
Rio Grande valley	1.38	1.82	+0.44
Tennessee	5.69	2.46	−3.23
Ohio valley	4.01	2.14	−1.87
Lower lake region	2.72	1.27	−1.45
Upper lake region	1.97	1.53	−0.44
Extreme northwest	0.71	0.26	−0.45
Upper Mississippi valley	2.48	0.81	−1.67
Missouri valley	0.90	0.44	−0.46
Northern slope	0.51	0.94	+0.43
Middle slope	0.42	0.51	+0.09
Southern slope	0.66	0.53	−0.13
Southern plateau	1.14	0.62	−0.52
Middle plateau	1.31	1.48	+0.17
Northern plateau	2.68	2.80	+0.12
North Pacific coast region	7.45	6.56	−0.89
Middle Pacific coast region	4.15	0.66	−3.49
South Pacific coast region	2.52	0.08	−2.44
Mount Washington, N. H.	4.15	1.87	−2.28
Pike's Peak, Colo.	1.61	3.91	+2.30

Table of excessive, and greatest monthly precipitation—February, 1885.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
Alabama.				*New Jersey.*			
Newton	9	2.00	6.25	Paterson	8, 9	2.23	
Do	25	2.75		*New York.*			
California.				New York City	9, 10	2.62	6.09
Fort Gaston			6.26	David's Island	9	2.10	
Connecticut.				Fort Hamilton	9	2.06	
Bethel	9	2.00		Fort Columbus	9, 10	2.08	
Southington	9, 10	2.10		White Plains	9	2.00	
Hartford	9, 10	2.10		Do	17, 18	2.65	
New London	9, 10	2.05		*North Carolina.*			
New Haven	9, 10	2.10		Kitty Hawk	6	2.10	6.17
Florida.				Brevard	8, 9	2.05	
Cedar Keys	13, 14	2.88	9.02	*Oregon.*			
Do	25	3.27		Bandon	2, 3	3.09	12.42
Newport	8, 9	2.95	7.13	Do	16, 17	2.48	
Do	24, 25	2.52		Astoria	18, 19	2.60	10.59
Archer			6.90	Do	25, 26	2.22	
Saint Augustine	12, 13	3.21		Eola			7.06
Fort Barrancas	24	3.10		Portland			6.72
Sanford	13, 14	2.37		East Portland			6.08
Jacksonville	13, 14	2.20		*Pennsylvania.*			
Pensacola	24	2.33		West Chester	15, 16	2.05	6.39
Limona	12	2.20		South Bethlehem	16	2.29	6.23
Georgia.				Haverford College	16	2.05	
Gainesville			6.20	*Rhode Island.*			
Louisiana.				Nyatt Point	16	2.00	
Shreveport	23, 24	2.19		*Texas.*			
Maine.				Palestine	23	2.44	
Gardiner	10	3.25	6.44	*Washington Ter.*			
Portland	10	2.95		Neah Bay	12, 13	4.40	18.50
Orono	9, 10	2.20		Do	18, 19	3.35	
Maryland.				Do	24, 25	2.75	
Great Falls	10	2.10		Tatoosh Island	1, 2, 3	3.66	13.28
Massachusetts.				Do	18, 19	2.75	
Wood's Holl			6.06	Do	24, 25	2.17	
Amherst	9, 10	2.12		Pysht	1 to 4	5.23	12.37
Leicester	9, 10	2.07		Do	18, 19	2.07	
Westborough	9, 10	2.56		Fort Canby	18, 19	2.32	11.20
Rowe	16	2.00		Do	25, 26	3.09	
Worcester	8, 9	2.15		Olympia	3, 4	2.45	7.67
Mississippi.							
Vicksburg	24	2.24					

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by reports from the regular Signal Service stations are shown in the table of average precipition for the several districts and in the table of miscellaneous meteorological data. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 1.47, is 7.89 below the February average for the three preceding years.

Dakota.—Webster, Day county: precipitation for the month was inappreciable, the February average for the two preceding years being 4.82.

Illinois.—Mattoon, Coles county: monthly precipitation, 0.65, is 6.00 below the February average for the last five years.

Sycamore, DeKalb county: monthly precipitation, 1.55, is 1.28 below the February average for the last three years.

Riley, McHenry county: monthly precipitation, 1.92, is 0.27 in excess of the February average for the last twenty-two years.

Anna, Union county: monthly precipitation, 1.22, is 3.01 below the February average for the last ten years.

Swanwick, Perry county: monthly precipitation, 0.66, is 6.01 below the February average the three preceding years.

Indiana.—Logansport, Cass county: monthly precipitation, 4.10, is 1.26 above the February average for the last twenty-six years.

Wabash, Wabash county: monthly precipitation, 1.26, is 2.12 below the February average for the last nine years. The monthly snowfall for January and February, 34.3 inches, is the largest that has occurred for many years.

Vevay, Switzerland county: monthly precipitation, 2.46, is 1.30 below the February average for the last twenty-one years. The snowfall, 9.1 inches, exceeds the February average by 5.3 inches, and has been greater in February but once in the above period, viz: 11.8 inches in 1867.

Spiceland, Henry county: monthly precipitation, 1.53, is 1.05 below the February average for the last thirty-one years. The snowfall, 10.8 inches, is 5 inches in excess of the February average.

Iowa.—Muscatine, Muscatine county: monthly precipitation, 2.21, is 0.39 above the February average for the last thirty-eight years.

Kansas.—Yates Centre, Woodson county: monthly precipitation, 0.55, is 1.85 below the February average for the last eight years. The precipitation for the winter months, 4.61, is about the normal, but the winter snow-fall is more than double the average amount.

Lawrence, Douglas county: monthly precipitation, 1.12, is 0.19 below the February average for the last seventeen years. The monthly snowfall, 11 inches, is nearly three times the February average.

Wellington, Sumner county: monthly precipitation, 0.57, is 0.55 below the February average for the last seven years.

Maryland.—Fallston, Harford county: monthly precipitation, 4.59, is 0.78 above the February average for the last fourteen years.

Massachussetts.—Worcester, Worcester county: monthly precipitation, 3.49, is 0.34 in excess of the February average.

New Hampshire.—Contoocook, Merrimac county: monthly precipitation, 3.80, is 1.00 above the February average. The monthly snowfall, 22 inches, exceeds the February average by 4 inches.

New York.—Palermo, Oswego county: monthly precipitation, 2.55, is 0.30 below the February average for the last thirty-two years. The monthly snowfall, 25.5 inches, is 3 inches above the February average for the period above named. The largest and smallest monthly snowfalls during the same time, are, 61 inches in 1856, and 1 inch in 1877.

North Volney, Oswego county: monthly precipitation is 2.20, or 0.52 below the February average for the last thirteen years. The precipitation for the winter of 1884–'85 is 8.85, the average for the above period being 9.27.

Ohio.—Wauseon, Fulton county: monthly precipitation, 1.15, is 1.94 below the February average for the last eleven years. The snowfall, 10.2 inches, is about 2 inches above the average.

Pennsylvania.—Dyberry, Wayne county: monthly precipitation, 2.75, is about the February average for the last sixteen years. The mouthly snowfall, 22 inches, exceeds by 7 inches the average for a period of twenty-nine years.

Vermont.—Woodstock, Windsor county: monthly precipitation is 2.85, the average for February during the last sixteen years being 2.82.

Virginia.—Variety Mills, Nelson county: monthly precipitation, 3.61, is 0.08 above the average for the last six years.

Wytheville, Wythe county: monthly precipitation, 1.94, is 1.50 below the February average for a period of seventeen years.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 2.65, is 1.90 below the February average for the last nine years.

SNOW.

The dates on which snow fell in the various districts are as follows:

New England.—1st to 11th, 13th to 18th, 21st, 23d, 24th, 25th, 27th, 28th.

Middle Atlantic states.—1st, 2d, 3d, 5th, 6th, 8th to 11th, 13th, 20th, 22d, 24th to 28th.

South Atlantic states.—5th, 12th to 16th, 18th, 19th, 20th, 24th.

Eastern Gulf states.—Vicksburg, Mississippi, and Mount Vernon Barracks, Alabama, 11th, 12th; Montgomery, Birmingham, Green Springs, Greensborough, Alabama, and Forsyth, Georgia, 12th; Athens, Georgia, 12th, 15th, 17th.

Western Gulf states.—Palestine and Cleburne, Texas, 11th, 12th, 13th; Shreveport, Louisiana, 11th, 12th, 13th, 21st; Point Pleasant, Louisiana, 2d, 6th, 7th, 10th, 16th, 26th, 27th; Fort Smith, Arkansas, 9th, 15th, 16th; Little Rock, Arkansas, 13th, 16th; Lead Hill, Arkansas, 23d, 28th.

Tennessee.—9th, 10th, 12th to 16th, 18th, 19th.

Ohio valley.—1st, 2d, 5th, 6th, 7th, 9th to 20th, 22d to 27th.

Lower lake region.—1st to 12th, 14th to 27th.

Upper lake region.—1st to 16th, 18th to 22d, 26th, 27th, 28th.

Extreme northwest.—1st, 3d to 8th, 10th, 11th, 13th, 14th, 16th, 17th, 18th, 20th, 22d, 23d, 28th.

Upper Mississippi valley.—1st, 2d, 4th to 9th, 11th to 17th, 19th to 23d, 24th, 28th.

Missouri valley.—1st, 3d to 9th, 11th to 17th, 19th, 21st to 24th, 28th.

Northern slope.—4th, 6th to 28th.

Middle slope.—4th, 7th, 8th, 9th, 10th, 12th, 14th, 15th, 17th, 19th to 25th, 28th.

Southern slope.—Forts Concho, Davis and Stockton, Texas, 13th.

Southern plateau.—8th, 14th, 22d to 25th, 28th.

Middle plateau.—4th, 6th to 15th, 18th, 19th, 20th, 22d, 23d, 27th.

Northern plateau.—6th to 13th, 18th.

North Pacific coast region.—Pysht, Washington Territory, 9th.

The following notes relate to the severe snow-storms of the month.

Portland, Maine: the snow-storm on the night of the 1-2d delayed trains for several hours.

Detroit, Michigan: snow fell to a depth of eight inches on the 9th; during the 9th, 10th and 11th all trains were delayed in consequence of snow blockades and the intensely cold weather.

Grand Haven, Michigan: trains were delayed on the 7th by the heavy snowfall; on the 9th the snow drifted to depths of from one to seven feet; all trains from the north and east were delayed from twelve to fifteen hours. Railroad traffic was interrupted until the 13th in consequence of snow blockades and the extremely cold weather.

Jackson, Jackson county, Michigan: the severe snow-storm of the 9th and 10th ended during the morning of the latter date, when the snow was three feet deep on the level.

Grand Rapids, Michigan: the snow-storm of the 9th and 10th was the severest of the winter; snow fell to a depth of three feet; no trains arrived and but one left this place on the 10th.

Port Huron, Michigan: the severest snow-storm of the season prevailed on the 9th, blockading the railroads; the snow blockade continued on the 10th and 11th.

Chicago, Illinois: trains were delayed by snow blockades on the 9th and 10th.

Des Moines, Iowa: on the 9th the snow drifted to depths of from four to five feet and travel on the railroads was interrupted; the snow blockades continued on the 10th; trains were run regularly on the 11th.

Dubuque, Iowa: the snow storm of the 9th was the severest of the season; all railroads entering the city were blockaded on the 9th, 10th and 11th. On the 16th and 19th the high winds caused the snow to drift badly, resulting in much inconvenience.

Cape May, New Jersey: snow fell all day on the 13th; it began again at 1 p. m. on the 14th and ended during the night; on the 15th it was twelve inches deep on the level, and, in places, drifts were from seven to nine feet deep.

Plymouth, Grafton county, New Hampshire: the severest snow storm of the season occurred during the night of the 16-17th; snow fell to a depth of eighteen inches, causing the delay of railway trains and rendering the highways impassable.

Chester, Windsor county, Vermont: the snow storm on the night of the 16-17th was very severe; roads were rendered impassable by snow-drifts.

Troy, New York: the severe snow storm on the 16th, blockaded the railroads and caused much inconvenience; the country roads were, in some places obstructed by drifts twenty feet in depth.

Oswego, New York: all trains on the Rome, Watertown and Ogdensburg railroad were abandoned on the 16th, except those running between Charlotte and Niagara Falls.

Bangor, Maine: snow fell to a depth of twelve inches on the 17th; deep drifts formed, causing delay of trains from five to six hours.

Montreal, Province of Quebec: no trains arrived at this place on the 17th owing to the large quantities of snow drifted on the tracks.

MONTHLY SNOW-FALLS.

[*Expressed in inches and tenths.*]

Monthly snowfalls of three inches or more were reported from the various states and territories during the month as follows:

Alabama.—Greensborough, 6.5; Green Springs, 6.0.

Arkansas.—Lead Hill, 7.5.

California.—Summit, 5.0.

Colorado.—Pike's Peak, 38.9; Denver, 7; Pueblo, 6.0; West Las Animas, 3.9.

Connecticut.—North Colebrook, 23.0; Bethel, 14.2; New London, 10.1; Southington, 8.5; Hartford, 7.0; New Haven, 6.4; Voluntown, 5.0.

Dakota.—Fort Buford, 26.1; Deadwood, 14.1; Yankton, 4.1; Bismarck, 3.5; Fort Bennett, 3.2.

Delaware.—Delaware Breakwater, 8.1.

District of Columbia.—Washington City, 13.2; West Washington, 11.8.

Georgia.—Augusta, 4.7.

Idaho.—Lewiston, 24.0.

Illinois.—Rockford, 25.0; Edgington, 24.5; Aurora, 20.9; Riley and Marengo, 19.8; Chicago, 19.0; Charleston, 16.6; Greenville, 16.5; Sycamore, 15.5; Prairieville, 14.5; Wilton Center, 13.0; Sandwick, 12.5; Springfield, 11.3; Anna and Peoria, 11.0; Mascoutah, Centralia, and McLeansborough, 8.5; Anna, 8.2; Bunker Hill, 7.2; Mattoon, 7.0; Fairfield, 5.6; Swanwick, 5.5.

Indiana.—Logansport, 23.2; Dana, 20.0; Lafayette, 17.2; Summan, 15.1; Guilford, 14.7; La Grange, 14.3; Mauzy, 13.6; Knightstown, 12.0; Wabash, 11.5; Greencastle, 11.0; Spiceland, 10.8; Columbus, 10.2; Brookville, 10.1; Miami, Fort Wayne, and Terre Haute, 10.0; Farmland, 9.5; Vevay, 9.1; Degonia Springs and Princeton, 9.0; Worthington, 8.8; Richmond, 8.6; Greenfield and Franklin, 8.5; Indianapolis, 8.1; Noblesville, 6.0; Blue Lick, 5.8; Huntingburg, 4.8; Jefferson, 4.0; Laconia, 3.5; Marengo, 3.0.

Iowa.—Muscatine, 24.2; Ottumwa, 19.0; Keokuk, 17.4; Cedar Rapids, 17.1; Fort Madison, 15.0; Davenport, 14.9; Oskaloosa, 14.8; Des Moines, 11.6; Humboldt, 10.4; West Union, 9.9; Dubuque, 9.0; Independence, 8.6; Monticello, 7.2; Cresco, 3.5.

Kansas.—Fort Scott, 15.5; Clay Centre, 11.9; Leavenworth, 11.7; Atchison, 11.5; Wyandotte, 11.2; Lawrence, 11.0; Holton, 10.8; Allison, 9.4; Maud, 9.0; Wellington, 5.5; Manhattan, 6.0; Yates Centre, 5.5; Sherlock, 5.3; Emporia, 4.6; Dodge City, 4.5.

Kentucky.—Frankfort, 6.1; Richmond, 5.8; Louisville, 3.6.

Maine.—Gardiner, 26.8; Orono, 22.0; Waterville, 17.5; Eastport, 12.0; Portland, 7.2.

Maryland.—Cumberland, 20.0; Baltimore, 17.2; Fallston, 16.0; Woodstock, 12.6.

Massachusetts.—Rowe, 21.2; Williamstown, 14.5; New Bedford, 13.0; Kingston, 12.0; Leicester, 11.5; Princeton, 11.0; Taunton and Dudley, 10.2; Fall River, 10.0. Somerset, 9.5; Westborough, 8.8; Readville and Blue Hill, 7.9; Lowell, 7.0; Amherst, 6.5; Fitchburg, 6.2; Concord, 5.2.

Michigan.—Traverse City, 30.0; Thornville, 22.5; Ionia, 22.0; Grand Haven, 20.4; Mottville, 18.5; Alpena, 18.2; Port Huron, 18.1; Manistique, 17.8; Harrisville, 16.6; Swartz Creek, 16.0; Detroit, 15.3; Moorestown and Ann Arbor, 14.0; Mackinaw City, 13.4; Lansing, 12.4; Hudson, 10.5; Northport, 9.0; Marquette, 6.7; Escanaba, 6.6.

Minnesota.—Northfield, 7.5; Chester, 5.0; Duluth, 4.4; Minneapolis, 3.3.

Missouri.—Curryville, 11.2; Independence, 10.0; Pierce City, 9.0; Springfield, 4.5; Saint Louis, 4.2.

Montana.—Fort Custer, 20.3; Fort Shaw, 10.6; Fort Maginnis, 9.8; Poplar River 9.5; Helena, 7.7; Fort Benton, 5.9; Fort Assinaboine, 4.0.

Nebraska.—Superior, 17.5; Tecumseh and Syracuse, 15.0; Fairbury, 13.0; Weeping Water and Red Willow, 12.0; Madison, 11.5; Stockham, 10.5; Dawson and Neligh, 10.0; Genoa, 9.2; Ogallala, 9.0; Beaver Creek, 8.8; Keene, 8.0; De Soto, 7.6; Fremont, 6.3; Ashland, 6.0; Omaha, Crete, and Marquette, 5.8.

Nevada.—Palisade, 13.0; Otego, 9.2; Battle Mountain, Wells, and Toana, 6.5; Winnemucca, 5.7; Elko, 4.0; Carlin, 3.0.

New Hampshire.—Contoocook, 24.0; Concord, 13.0; Hanover, 10.0; Mount Washington, 9.5.

New Jersey.—Atlantic City, 22.0; Somerville, 21.0; Cape Henry and Moorestown, 20.8; South Orange and Vineland, 13.0; Sandy Hook, 10.8; Paterson, 10.5; Phillipsburg, 8.0; Little Egg Harbor, 7.4; Dover, 7.0; Barnegat City, 4.6.

New Mexico.—Santa Fé, 5.8.

New York.—Palermo, 25.5; Cooperstown, 24.0; Auburn, 23.5; Port Jervis, 21.0; Factoryville, 19.1; Ithaca, 18.9; Rochester, 17.0; New York City, 16.7; Humphrey, 15.0; White Plains, 13.5; Penn Yan, 13.0; Menand Station, 11.8; Le Roy, 11.6; Buffalo, 10.8; Mountainville, 10.2; Albany, 9.8; Oswego, 8.1.

North Carolina.—Statesville, 9.5; Brevard, 7.0; Chapel Hill, 6.6; Lenoir, 6.0; Charlotte, 4.9; Weldon, 3.6

Ohio.—Jacksonborough, 19.0; McConnelsville, 17.2; College Hill, 13.8; Cincinnati, and Washington Court House, 13.3; North Lewisburg and Columbus, 11.5; Hiram, 11.0; Wauseon, 10.2; Garrettsville, 9.8; Portsmouth, 9.5; Westerville, 9.3; Marietta and Ruggles, 7.0; Toledo, 6.7; Tiffin, 6.0; Upper Sandusky, 5.9; Sandusky, 3.2.

Pennsylvania.—Wellsborough, 22.6; Dyberry, 22.0; Blooming Grove, 21.5; Troy, 21.0; Catawissa, 20.4; Easton, Germantown, and Grampian Hills, 19.0; West Chester and Chambersburg, 18.2; Leetsdale, 17.8; Falsington, 17.2; Erie, 17.0; Quakertown, 15.5; Haverford College, 15.2; South Bethlehem, 15.0; Pittsburg, 14.2; Philadelphia, 13.4; Dillingersville, 11.2.

Rhode Island.—Block Island, 10.3; Providence, 10.0; Point Judith, 6.5; Nyatt Point, 5.6.

Tennessee.—Fostoria and Grief, 6.5; Farmingdale, 6.1; Ashwood and Greenville, 5.0; Chattanooga, 4.9; Savannah, 4.0; Milan, 3.2; Austin and Sweet Water, 3.0.

Texas.—Fort Elliott, 6.4; Fort Stockton, 5.2.

Utah.—Ogden, 21.2; Promontory, 17.2; Corinne, 16.5; Salt Lake City, 13.6; Kelton, 6.5; Blue Creek, 3.8.

Vermont.—Newport, 28.8; Dorset, 24.0; Lunenburg, 22.5; Woodstock, 22.0; Strafford, 19.0; Charlotte, 11.0; Burlington and Brattleborough, 16.0; Post Mills, 6.0.

Virginia.—Dale Enterprise, 17.0; Chincoteague, 15.6; Wytheville, 14.0; Fort Myer, 10.8; Marion and Blacksburg, 10.0; Lynchburg, 9.9; Bird's Nest, 9.0; Variety Mills, 7.7.

Washington Territory.—Dayton, 5.9; Spokane Falls, 3.3.

West Virginia.—Helvetia, 23.0; Wellsburg, 9.0.

Wisconsin.—Sussex, 12.6; Beloit, 12.1; Madison, 8.8; Manitowoc, 7.6; Prairie du Chien, 7.3; Embarras, 6.2; La Crosse, 3.6; Milwaukee, 3.5.

Wyoming.—Cheyenne, 10.3.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF THE MONTH.

[*Expressed in inches and tenths.*]

Colorado.—Pike's Peak, 12.0; Denver, 3.0.

Connecticut.—North Colebrook, 16.0; Bethel and Hartford, 3.0; New London, 2.3; Southington, 2.0.

Dakota.—Deadwood, 6.5; Fort Buford, 5.0; Bismarck, 2.0; Webster, trace; Fort Totten, snow in the woods and ravines, none on ground.

District of Columbia.—West Washington, 3.0; Washington, 1.0.

Illinois.—Chicago, 18.3; Edgington, 16.0; Sandwick, 14.0; Sycamore and Wilton Centre, 13.0; Marengo, 10.0; Aurora and Prairieville, 8.0; Riley, 6 to 15; Mattoon, trace to 48.0; Swanwick and Springfield, trace.

Indiana.—Wabash, 20.0; Logansport and Lafayette, 6.0;

Fort Wayne, 4.5; Greencastle, about 2.0; Guilford and Spiceland, 1.0; La Grange, in drifts; Sunman, trace.

Iowa.—Cresco, 20.0; West Union, 18.0; Humboldt, 15.0; Cedar Rapids, 12.0; Muscatine and Independence, 10.0; Monticello, 6.0; Des Moines, 5.0; Keokuk; 4.0; Manchester, 3.0; Dubuque, 0.5.

Kansas.—Allison, in drifts; Dodge City, Yates Center, and Wyandotte, trace.

Maine.—Orono, 30.0; Gardiner, 24.0; Eastport, 12.0; Portland, 6.0.

Maryland.—Cumberland, 6.0; Emmitsburg and Woodstock, 4.0; Fallston, 2.0; Baltimore, 1.0.

Massachusetts.—Rowe, in the woods, 30.0, and in open field from one to five feet; Deerfield, 19.0; Leicester, 10.0; Amherst, 6.0 to 8.0; Mendon and Westborough, 5.0; Williamstown, 4.0; Boston, 3.0; Fall River, 2.0; Readville, 1.0.

Michigan.—Marquette, 37.0 (?); Ionia, 30.0; Swartz Creek and Moorestown, 24.0; Thornville, 20.0; Grand Haven, 18.0; Traverse City, 17.0; Hudson, 16.0; Detroit, 15.0; Mackinaw City, 8.0; Alpena, 7.0; Port Huron, 6.5; Ann Arbor, 6.0; Northport, 3.2; Escanaba, 0.5.

Minnesota.—Saint Vincent, 4.0; Duluth, 3.0; Northfield, 2.6; Saint Paul, 2.0.

Missouri.—Independence, 4; Curryville, Pierce City, and Lamar, trace.

Montana.—Poplar River, 4.0; Fort Maginnis, 2.5.

Nebraska.—Tecumseh, 8.0; Red Willow, 1.0; Fairbury and De Soto, 0.5; Marquette and Beaver Creek, trace.

New Hampshire.—Contoocook, 22.0; Mount Washington, 18.0.

New Jersey.—Paterson, 4.0; Cape May, 3.0; South Orange, 2.0; Sandy Hook, 1.5; Barnegat, 1.0; Atlantic City, trace.

New Mexico.—Santa Fé, on mountains, 24.0 and none in valleys.

New York.—Palermo, 31.0; North Volney, 25.0; Oswego, 24.0; Le Roy and Cooperstown, 20.0; Auburn, 18.0; Humphrey and Menand Station, 14.0; Rochester, 11.0; Penn Yan, 10.0; Albany, 8.0; Ithaca, 7.0; Buffalo, 6.0; Factoryville, 5.0; White Plains, 4.0.

Ohio.—Wauseon, 13.0; Garrettsville, 8.5; Hiram, 6.0; Tiffin, 5.0; Toledo, 3.5; North Lewisburg, 3.0; Sandusky, 2.0; Ruggles, 0.6; Jacksonborough and Cleveland, 1.0; College Hill, Columbus, and Cincinnati, trace.

Pennsylvania.—Dyberry and Grampian Hills, 18.0; Blooming Grove, 15.0; Wellsboro, 10.5; Dillingersville, 8.0; Chambersburg, 7.8; Quakertown, 7.1; South Bethlehem, 6.0; Fallsington, West Chester, and Troy, 3.0; Leetsdale, Pittsburg, Haverford College, and Philadelphia, 2.0; Erie, 1.0.

Rhode Island.—Block Island, trace.

Vermont.—Strafford, 30.0; Post Mills, 20.0; Woodstock, 19.4; Dorset, 16.0; Burlington, 8.0; Charlotte, 2.0.

Virginia.—Dale Enterprise, 4.0; Wytheville, Variety Mills, and Blacksburg, 2.0; Lynchburg, 0.5; Marion, trace.

West Virginia.—Helvetia, 8.0; Wellsboro, 1.0.

Wisconsin.—Manitowoc, 48.0 to 60.0; Embarras, 20.0; Wausau, 14.0; Neillsville, 12.5; La Crosse, 11.0; Madison, 8.0; Beloit, 4.0; Milwaukee, 0.5.

Wyoming.—Cheyenne, 0.5.

SLEET.

Arizona.—Prescott, 23d; Fort Bowie, 12th.

Arkansas.—Little Rock, 23d, covering all exposed objects with a coating of ice; the telegraph lines in all directions were broken. Fort Smith, 23d.

Connecticut.—Bethel, 9th, 16th; Hartford and North Colebrook, 16th.

Dakota.—Fort Sully, 5th.

District of Columbia.—Washington City, 1st, 2d, 5th.

Georgia.—Athens, 15th, 24th.

Illinois.—Cairo, 9th.

Indiana.—Sunman, 13th; Logansport, 8th; Greencastle, 9th, 26th; Indianapolis, 9th, 24th.

Kansas.—Yates Centre, 25th.

Kentucky.—Louisville, 15th, 24th.

Maine.—Cornish, 16th; Eastport, 5th; Bangor, 10th.

Maryland.—Emmitsburg, 4th, 9th; Baltimore, 6th.

Michigan.—Escanaba, 3d; Detroit, 9th.

Missouri.—Saint Louis, 9th.

New Hampshire.—Mount Washington, 10th.

New Jersey.—Atlantic City, 14th, 15th.

New York.—Rochester and Oswego, 9th; Buffalo, 1st; Albany, 10th; New York City, 16th.

North Carolina.—Statesville, 12th, 15th, 24th; Charlotte, 14th.

Ohio.—Toledo, 9th; Cleveland, 4th, 5th.

Tennessee.—Milan and Memphis, 23d; Nashville and Chattanooga, 24th.

Texas.—Palestine, 21st; El Paso, 25th.

Virginia.—Fort Myer, 1st; Cape Henry and Fort Monroe, 14th.

Wisconsin.—Embarras, 27th.

HAIL.

Hail is reported to have fallen in the various states and territories as follows:

Alabama.—Mount Vernon Barracks, 12th, 21st; Mobile, 21st.

Arizona.—Fort Grant, 22d.

Connecticut.—Bethel, 9th, 16th, 17th.

Florida.—Mayport, 5th.

Georgia.—Savannah, 5th.

Idaho.—Cœur d'Alene, 16th, 27th.

Illinois.—Cairo, 8th.

Indiana.—Wabash and Fort Wayne, 9th; La Fayette, 8th; Spiceland, 24th.

Louisiana.—Point Pleasant, 17th.

Maine.—Waterville, 10th.

Maryland.—Woodstock, 10th.

Massachusetts.—Williamstown, 9th; Taunton, 8th.

New Jersey.—Moorestown, 16th.

New York.—New York City, Menand Station (near Albany), and Mountainville, 10th; Humphrey, 9th; Fort Columbus, 8th.

North Carolina.—Weldon, 13th, 14th; Statesville, 9th.

Ohio.—Jacksonborough, 9th.

Oregon.—Portland, 6th; Roseburg, 7th.

Pennsylvania.—Fallsington, 16th; Grampian Hills, 9th.

South Carolina.—Stateburg, 4th.

Tennessee.—Austin, 15th.

Texas.—Austin, 24th; Fort Davis, 25th.

Vermont.—Woodstock, 9th.

Virginia.—Fort Myer, 10th; Bird's Nest, 10th, 14th, 27th; Wytheville, 24th.

Washington Territory.—Tacoma, 26th.

SNOW SLIDE.

Salt Lake City, Utah: during the night of the 13-14th, the village of Alta, about forty miles southeast of Salt Lake City, was nearly buried beneath an immense snow slide. It had been snowing for nearly a week and the snow had accumulated to great depths. The snow slide occurred about 8 p. m., burying about three-fourths of the place. In the buildings under the snow were twenty-eight persons, some of whom were killed. The damage is estimated at more than $40,000.

WINDS.

The most frequent directions of the wind during February, 1885, are shown on chart ii. by arrows flying with the wind. In the lake region and central Mississippi and Ohio valleys they were westerly and southwesterly; in the Missouri valley, Gulf states, and on the middle Atlantic coast, they were northerly and northwesterly; in the north Pacific coast region, they were southerly; in the south Atlantic states, California, and in the Rocky mountain districts, they were variable.

HIGH WINDS.

(In miles per hour.)

Wind velocities of fifty or more miles per hour were recorded during the month as follows:

Mount Washington, New Hampshire, 64, sw., 1st; 100, nw., 2d; 99, sw., 3d; 88, nw., 4th; 60, w. 5th; 78, nw., 7th; 58, nw., 8th; 88, se., 9th; 92, se., 10th; 101, w., 11th; 86, sw., 13th; 108, se., 16th; 60, nw., 21st; 59, nw., 23d; 50, nw., 27th.

Pike's Peak, Colorado, 50, nw., 9th; 60, nw. 10th; 76, nw., 11th; 54, n., 13th; 55, nw., 15th; 52, nw., 27th.

Cape Mendocino, California, 92, se., 1st; 104, se., 2d; 76, se., 3d; 92, s., 18th; 56, s., 19th.

Sandy Hook, New Jersey, 54, w., 10th; 56, nw., 11th; 56, se. and nw., 16th; 56, w., 17th.

Cape May, New Jersey, 52, nw., 10th; 55, nw., 11th; 52, nw., 17th.

Kitty Hawk, North Carolina, 56, n., 14th; 54, n., 20th.

Buffalo, New York, 56, sw., 10th; 52, sw., 11th.

Fort Maginnis, Montana, 56, w., 2d; 64, w., 16th.

Fort Macon, North Carolina, 58, se., 16th.

Barnegat City, New Jersey, 58, se., 16th.

Boston, Massachusetts, 54, e., 16th.

Block Island, Rhode Island, 52, ne., 15th.

New Haven, Connecticut, 50, e., 16th.

Delaware, Breakwater, Delaware, 52, ne., 15th.

Cheyenne, Wyoming, 56, nw., 4th.

Chincoteague, Virginia, 52, nw., 1st.

Fort Buford, Dakota, 50, w., 3d.

The total movements of the air, with the highest velocities recorded during February at the various Signal Service stations, are shown in the table of miscellaneous meteorological data.

LOCAL STORMS AND TORNADOES.

Cape Mendocino, California, 1st: a high southeasterly wind prevailed during the day, increasing to hurricane force at night; it continued with great violence and reached a maximum velocity of one hundred and four miles during the early morning of the 2d.

Cape Lookout, North Carolina, 4th: during the morning light southerly winds prevailed, increasing in force during the afternoon and blowing at the rate of sixty miles per hour at 4 p. m.

Cheyenne, Wyoming: dangerously high winds from the northwest prevailed on the 4th; a violent gust of seventy miles per hour occurred at 3.30 p. m.; it lasted about one minute, carrying immense clouds of dust into the air.

Denver, Colorado: high westerly winds prevailed from 1.30 to 7.15 p. m. on the 4th; at 5 p. m. a velocity of sixty-four miles was recorded; out-buildings, trees, signs, etc., were blown down. At Georgetown, fifty miles distant, a railway train was blown from the track and several persons were injured. High winds also prevailed at Denver during the night of the 4–5th, and until 1.30 p. m.; a velocity of forty-two miles occurred at 5.20 a. m.

New River Inlet, North Carolina: a thunderstorm from the northwest prevailed from 5.10 to 5.20 p. m. on the 4th, accompanied by high winds and small hail; fencing and trees were blown down.

Fort Macon, North Carolina, 4th; a thunderstorm began at 5.45 p. m. and continued for thirty minutes, the wind reaching a velocity of fifty-two miles from the west.

Norwood, Warren County, Georgia: a tornado moving in a northeasterly direction occurred one mile northwest of this place at 6.30 p. m. on the 9th; numerous out-buildings were destroyed.

A tornado is also reported to have occurred twenty-seven miles northwest of Charlotte, North Carolina, on the 10th.

Kitty Hawk, North Carolina: a high northerly wind, accompanied by a severe snow squall which lasted fifteen minutes, occurred on the 20th; the squall of drifting snow and sand made it impossible to see objects twenty feet distant; a maximum wind velocity of fifty-four miles per hour occurred at 9.05 a. m.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger points in the rivers at the various stations, the highest and lowest stages for February, 1885, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, February, 1885.

[*Expressed in feet and tenths.*]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, Louisiana	29 9	1	24 1	23	15 6	8 5
Arkansas:						
Fort Smith, Arkansas	15 0	8, 9	8 2	22, 23	‡— 1 4	9 6
Little Rock, Arkansas	23 0	11	15 5	25	6 0	9 5
Missouri:						
Yankton, Dakota*	24 0					
Omaha, Nebraska*	18 0					
Leavenworth, Kansas*	20 0					
Mississippi:						
Saint Paul, Minnesota*	14 5					
La Crosse, Wisconsin*	24 0					
Dubuque, Iowa*	16 0					
Davenport, Iowa*	15 0					
Keokuk, Iowa*	14 0					
Saint Louis, Missouri	32 0	9	15 0	28	7 7	7 3
Cairo, Illinois	40 0	15, 16	27 9	27, 28	16 0	11 9
Memphis, Tennessee	34 0	1	26 9	28	10 7	16 2
Vicksburg, Mississippi	41 0	2, 3, 4	42 4	28	28 6	13 8
New Orleans, Louisiana†	—3 0	3, 8	— 1 5	28	— 3 6	2 1
Ohio:						
Pittsburg, Pennsylvania	22 0	11	8 3	24	1 8	6 5
Cincinnati, Ohio	50 0	12	29 2	25	7 3	21 9
Louisville, Kentucky	25 0	13	11 0	27	5 0	6 0
Cumberland:						
Nashville, Tennessee	40 0	1, 13	16 2	25	7 7	8 5
Tennessee:						
Knoxville, Tennessee						
Chattanooga, Tennessee	33 0	12	9 6	23, 24	5 0	4 6
Monongahela:						
Pittsburg, Pennsylvania	29 0	11	8 3	24	1 8	6 5
Savannah:						
Augusta, Georgia	32 0	11	20 8	24	8 6	12 2
Mobile:						
Mobile, Alabama		1	17 8	27	15 3	2 5
Sacramento:						
Red Bluff, California						
Sacramento, California		10–13	18 0	28	16 1	1 9
Willamette:						
Portland, Oregon		21	12 3	1	5 0	7 3
Colorado:						
Yuma, Arizona						

* Frozen the entire month. † Below high-water mark of 1874 and 1883. ‡ Below bench mark.

ICE IN RIVERS AND HARBORS.

Arkansas river.—Fort Smith, Arkansas; on the 12th, there were large quantities of ice in river.

Barnegat bay.—Barnegat City, New Jersey: bay frozen from 3d to 9th.

Chesapeake bay and Patapsco river.—Baltimore, Maryland: considerable ice in bay and river on 2d and 3d, interrupting navigation; ice formed rapidly on the 11th; on the 22d the harbor was frozen over, and ice is reported to have been three inches thick as far down as Point Lookout.

Chincoteague bay.—Chincoteague, Virginia: bay frozen from 21st to 25th; ice went out of bay on 26th.

Delaware bay.—Delaware Breakwater: on the 23d the harbor was frozen and the bay full of ice; the ice extended seaward as far as could be seen.

Delaware river.—Trenton, New Jersey: an ice-dam formed on the 10th, causing an overflow; in south Trenton scores of houses were flooded nearly to the second stories.

Goose lake.—Lake View, Oregon: the ice in the lake broke up on the 4th.

James river.—Lynchburg, Virginia: the river above the water works was frozen on the 21st, the ice being sufficiently strong to bear skaters; on the 24th, the ice was four inches thick.

Kentucky river.—Hawesville, Hancock county, Kentucky: on the 21st, the river was frozen across, the ice being three inches thick.

Kitty Hawk bay.—Kitty Hawk, North Carolina: ice formed in bay on the 11th; on the 21st navigation was interrupted by ice, and on the 22d the bay was frozen.

Lake Michigan.—Milwaukee, Wisconsin, 28th: navigation between this place and the ports on the opposite side of the lake was suspended during the whole month on account of heavy ice. At the close of the month there were three propellers fast in the ice in mid lake and others lying on the eastern shore were ice-bound, the harbors being blockaded with ice which, in some places, was thirty feet in depth. Between Milwaukee and Grand Haven there were only about ten miles of open water, and the south end of the lake was completely blocked with ice from shore to shore. Old navigators state that it has been many years since there was so much ice in Lake Michigan.

Grand Haven, Michigan: the harbor was blocked with ice from the 5th to the 9th, 11th to 14th, and from the 16th to 28th; on the 9th the high winds broke up the ice near the harbor entrance, and the propellers "Michigan" and "Milwaukee" reached open water, having been ice-bound since January 20th. On the 18th a part of the crew of the propeller "Oneida" arrived at Grand Haven, having abandoned the propeller on account of limited supply of provisions. They reported that the propeller was lying twenty-five miles south of Grand Haven surrounded by immense ice-fields which extended as far as could be seen from the cross-trees. The crew also reported that the ice extended from shore to shore, in places being heaped up to the height of thirty-five feet above the surface of the water.

Lake Ontario.—Hamilton, Ontario: on the 11th the lake was frozen for a distance of ten miles from the shore.

Little Egg harbor.—Little Egg Harbor, New Jersey: navigation was interrupted by ice on the 21st; the ice went out of the harbor on the 27th.

Long Island sound.—Whitestone, Long Island: on the 10th the entrance to the sound was obstructed by large ice-fields.

Mississippi river.—Cairo, Illinois: navigation between this place and Saint Louis was resumed on the 4th; it was again suspended on the 10th.

Memphis, Tennessee: navigation was closed on account of drift ice from the 15th to 26th; on the 28th the ice disappeared from the river.

The Mississippi river was frozen throughout the month from Keokuk, Iowa, northward.

Missouri river.—Fort Benton, Montana: the river opened gradually on the 28th.

The Missouri river was frozen from Yankton, Dakota, to Leavenworth, Kansas, throughout the month.

Narragansett bay.—Narragansett Pier, Rhode Island: large fields of ice passed out of the bay on the 8th, 9th, 13th, 14th, 15th, 24th, 25th.

New Haven harbor.—New Haven, Connecticut: the harbor was entirely frozen on the 11th; on the 17th the western end of Long Island sound was frozen and closed to navigation for the first time since the winter of 1872–'73.

New York harbor.—New York City: on the 2d large masses of ice were running in North river, rendering navigation difficult; also on the 5th, 6th, 7th, 11th, 17th, 18th, 21st, 23d; on the 25th the ice went out of the harbor.

Niagara river.—Buffalo, New York: on the 17th, ice was thirty-three inches thick. River men state that the river froze to a greater distance up the stream than has been known for many years.

Ohio river.—Pittsburg, Pennsylvania: floating ice from 10th to 13th, and from 16th to 24th.

Cincinnati, Ohio: drift ice in river on 1st, 2d, 3d; on the 4th the river was clear of ice and navigation was resumed to all points except Pittsburg; floating ice on 6th, 11th, 12th, 13th, interrupting navigation on the latter date, but navigation was resumed to points southward on the 14th; the heavy drift ice on the 15th caused general suspension of navigation; heavy drift ice continued from the 18th to the 28th; on the 26th the river was frozen half way across.

Louisville, Kentucky: floating ice on 1st, 2d, 4th, 6th, 10th to 28th; navigation was suspended on the 11th, 12th, 13th, and from 18th to 28th.

Cairo, Illinois: floating ice from 11th to 21st.

Oswego river.—Oswego, New York: the ice broke up on the 10th; the river froze again on the 11th.

Pamlico sound.—Portsmouth, North Carolina: on the 20th the ice extended to a distance of two hundred yards from the shore and was two inches in thickness.

Passamaquoddy bay.—Eastport, Maine: floating ice on the 27th and 28th.

Potomac river.—Washington, District of Columbia: along the shores the ice was about four inches thick on the 2d; the steamer "Arrowsmith" experienced much difficulty in making a trip to Alexandria on this date; the ice broke upon the 4th; on the 10th the river was free from ice, but it froze over on the 11th; on the 12th the ice was from four to five inches thick, and on the 23d, ice from seven to eight inches thick was harvested.

Raritan river.—New Brunswick, Middlesex county, New Jersey: the ice began to break up on the morning of the 10th.

Saint Clair river.—Port Huron, Michigan: the ice moved for a distance of several hundred feet on the 23d, leaving about one-fifth of the river open; the ferry-boats made regular trips on the 24th; the ice bridge at Gratiot remained firm on the latter date.

Snake river.—Lewiston, Idaho: ice broke on the 6th; only a slight rise occurred.

Sinepuxeat bay.—Ocean City, Maryland: the bay was nearly closed with ice on the 11th.

Susquehanna river.—Port Deposit, Maryland: an extensive ice-dam formed at this place on the 10th.

Thames river.—New London, Connecticut: large quantities of ice filled the river on the 26th.

Vineyard sound.—Vineyard Haven, Massachusetts: on the 20th no clear water could be seen, and the harbor was full of solid ice; twenty schooners were ice-bound.

West Branch, Susquehana river.—Lock Haven, Clinton county, Pennsylvania: on the 24th there was an ice-dam fifteen miles in length between Glen Union and Queen's Run, the ice being piled to a height of from fifteen to twenty-five feet in some places.

Yellowstone river.—Glendive, Montana: the ice broke on the morning of the 6th, and formed an ice-dam several miles in extent, causing an overflow of the lowlands above this place.

FLOODS.

Newburyport, Massachusetts: the heavy rain during the night of the 9-10th, and the melting of the snow flooded many cellars and caused a large amount of damage.

New Haven, Connecticut: considerable damage was caused by the freshet in the Housatonic and Naugatuck rivers during the night of the 9-10th; many cellars were flooded and a large part of the canal bank was washed away. At Bridgeport two dams were washed away.

Wilmington, Delaware: the Brandywine river rose rapidly during the night of the 9-10th; during the early morning of 10th an unfinished span of the Baltimore and Philadelphia railroad bridge was swept away, entailing a loss of $20.000.

Elkton, Cecil county, Maryland: the heavy rains during the night of the 9–10th caused the Big and Little Elk creeks to overflow, and a large amount of damage resulted.

Chester, Pennsylvania: the heavy rains of the 9th and the melting of the snow on the hillsides caused the water in Chester creek to rise to an unusual height. The Lenne dam broke, which resulted in considerable damage. At Rockdale, a mill was flooded and goods damaged to the extent of $3,000. The trestle work on the Chester creek railway was carried away, causing suspension of traffic.

HIGH TIDES.

New London, Connecticut, 16th.

Delaware Breakwater, Delaware, 16th.

Ocean City, Maryland, 14th, overflowing the beach, but caused no serious damage; high tide also on the 15th.

Narragansett Pier, Rhode Island, 9th, 16th.

Sandy Hook, New Jersey, 16th.
Barnegat City, New Jersey, 16th.
Fort Macon, North Carolina, 16th.
Hatteras, North Carolina, 10th, 14th, 16th.
New River Inlet, North Carolina, 1st, 2d, 9th, 10th, 16th, 17th.
Kitty Hawk, North Carolina, 14th, unusually high.
Philadelphia, Pennsylvania: the tide in the river on the 16th was the highest known since February, 1876, and in many places the water overflowed the wharves.

LOW TIDES.

Eastport, Maine, 2d, 3d, 24th.
Indianola, Texas, 15th.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

At Block Island, Rhode Island, observations were made from 11th to 28th, only; at New Haven, Connecticut, the harbor was frozen from 22d to 28th, during which time no observations were made; at Chincoteague, Virginia, observations were interrupted by ice from 21st to 24th; at Marquette, Michigan, no record was made, the signal office having been burned.

Temperature of water for February, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
	°	°	°		°
Atlantic City, New Jersey	35.8	29.5	6.0	3 7	25.7
Alpena, Michigan †					
Augusta, Georgia	59.7	36.6	13.1	12 0	42.8
Baltimore, Maryland	35.1	31.9	3.2	9 8	28.5
Block Island, Rhode Island*	34.0	29.0	5.0	7 0	24.2
Boston, Massachusetts	30.0	28.6	1.4	21 9	20.5
Buffalo, New York †					
Canby, Fort, Washington Territory	47.1	42.1	5.0	17 3	45.7
Cedar Keys, Florida	62.3	53.4	8.9	9 6	54.9
Charleston, South Carolina	57.0	45.1	11.9	40 8	47.5
Chicago, Illinois †					
Chincoteague, Virginia *	40.5	30.1	10.4	5 6	31.5
Cleveland, Ohio †					
Detroit, Michigan †					
Delaware Breakwater, Delaware	35.3	19.8	15.7	9 8	28.4
Duluth, Minnesota †					
Eastport, Maine	35.3	32.5	2.8	14 7	18.5
Escanaba, Michigan †					
Galveston, Texas	60.4	45.3	15.1	12 4	52.6
Grand Haven, Michigan †					
Indianola, Texas	61.9	45.1	16.8	9 0	51.7
Jacksonville, Florida	59.0	54.0	5.6	18 0	54.3
Key West, Florida	76.8	64.0	12.8	17 2	68.2
Mackinaw City, Michigan †					
Macon, Fort, North Carolina	52.2	42.0	10.2	6 8	41 5
Marquette, Michigan *					
Milwaukee, Wisconsin †					
Mobile, Alabama	75.4	43.1	32.3	16 5	48.3
New Haven, Connecticut *	31.2	29.7	1.5	16 4	19.7
New London, Connecticut	36.9	32.9	4.0	11 4	22.7
New York City	33.0	30.4	2.6	15 9	23.1
Norfolk, Virginia	44.4	33.8	10.6	17 1	37.2
Pensacola, Florida	58.3	49.5	8.5	16 9	50.7
Portland, Maine	33.3	30.3	3.0	16 8	30.3
Portland, Oregon	46.5	40.6	5.9	59 0	47.1
Sandusky, Ohio †					
Sandy Hook, New Jersey	36.3	31.1	5.2	1 9	25.2
San Francisco, California	54.8	53.1	1.7	36 9	54.4
Savannah, Georgia	51.2	41.1	10.1	10 0	49.6
Smithville, North Carolina	51.0	45.5	5.5	10 6	42.5
Toledo, Ohio †					
Wilmington, North Carolina	49.5	41.0	8.5	14 5	45.1

* Record incomplete—see text. † Frozen the entire month.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for February, 1885, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 82.79 per cent. The percentages for the four elements are: Weather, 85.08; direction of the wind, 77.92; temperature, 82.19; barometer, 88.88 per cent. By geographical districts, they are: For New England, 83.93; middle Atlantic states, 83.89; south Atlantic states, 83.25; eastern Gulf states, 84.18; western Gulf states, 84.77; lower lake region, 83.72; upper lake region, 81.87; Ohio valley and Tennessee, 82.76; upper Mississippi valley, 83.19; Missouri valley, 74.83; north Pacific coast region, 96.00; middle Pacific coast region, 76.92; south Pacific coast region, 97.22. There were twenty omissions to predict out of 3,011, or 0.66 per cent. Of the 2,991 predictions that have been made, eighty-four, or 2.81 per cent., are considered to have entirely failed; one hundred and twenty-nine, or 4.31 per cent., were one-fourth verified; four hundred and twenty-seven, or 14.28 per cent., were one-half verified; four hundred and eighty-two, or 16.11 per cent., were three-fourths verified; 1,869, or 62.49 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During February, 1885, one hundred and sixty cautionary signals were ordered. Of these, one hundred and forty-four, or 93.75 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Seventy-seven cautionary off-shore signals were ordered, all of which were justified as to direction, and seventy, or 90.90 per cent., were justified as to velocity. Two hundred and thirty-seven signals of all kinds were ordered, two hundred and twenty, or 92.83 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, fifty-four were changed from cautionary signals. Six signals were ordered late. In eighty-four cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During February, 1885, there were one hundred and forty-five cold-wave signals ordered, of which number one hundred and twenty-nine, or 89.0 per cent. were justified.

RAILWAY WEATHER SIGNALS.

The following is from the February, 1885, report of the "Alabama Weather Service," under direction of Professor P. H. Mell, jr.:

The predictions for the month of February telegraphed by General Hazen, the Chief Signal Officer, were as follows:

Local rains.—5th, 8th, 9th, 12th, 13th, 14th, 15th, 18th, 24th, 25th.

Fair weather.—1st, 2d, 3d, 4th, 6th, 7th, 10th, 11th, 16th, 17th, 19th, 20th, 21st, 22d, 23d, 26th, 27th, 28th.

Lower temperature.—1st, 2d, 5th, 6th, 9th, 10th, 13th, 16th, 18th, 20th.

Higher temperature.—3d, 4th, 7th, 8th, 12th, 14th, 15th, 17th, 22d, 23d, 24th, 26th, 27th, 28th.

Stationary temperature.—11th, 19th, 21st, 25th.

Cold wave signals ordered 8th, 9th, 16th.

A careful examination of the meteorological reports from all quarters of the state shows the verification of the weather predictions to be 92 per cent. and of the temperature 94 per cent.

ATMOSPHERIC ELECTRICITY.

AURORAS.

During February, 1885, there occurred two auroral displays which were widely observed in the northern districts; these were observed during the nights of the 5–6th and 11–12th, and were reported by numerous stations from New England westward to Montana. The following reports relating to the displays of February have been received:

Captain Irving, commanding the s. s. "Republic," reports having observed an aurora on the 5th in latitude N. 49°, longitude W. 34°.

Point Judith, Rhode Island, 5th: at 7.05 p. m. an auroral arch covered 70° of the northern horizon; it was about 5° in width and at its highest point about 8° above the horizon; the display continued until the early morning of the 6th. From 12.05 a. m. until daylight of the 12th a pale auroral light of straw color, with occasional beams, was observed.

Alpena, Michigan, 5th: an auroral light was first noticed at 8.40 p. m. consisting of a diffuse light without streamers; it disappeared at 10.30 p. m.

Grand Haven, Michigan, 5th: a faint aurora was visible

Table of miscellaneous meteorological data for February, 1885—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure.							Temperature of the air (in degrees Fahrenheit).														Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal	Winds.				No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly mean.	Departure from normal.	Extremes.						Daily ranges.										Total movement.	Prevailing direction.	Max. velocity.					
					Highest barometer	Date.	Lowest barometer	Date.	Monthly range of barometer.		Max.	Date.	Mean max	Min.	Date.	Mean min	Monthly range.	Greatest.	Date.	Least.	Date.							Miles p.hr	Direction	Date.				
New England.																																	
Eastport	61	29.78	—.19	29.85	30.42	16	29.01	10	1.41	18.5	—4.4	43.2	10	26.0	—10.6	3	11.4	53.8	36.3	2	6.5	13	73.0	11.2	2.95	—1.29	8.053	nw.	44	se.	17	9	9	10	9
Portland	45	29.85	—.18	29.90	30.36	24	28 88	10	1.48	20.3	—6.6	46.1	10	30.9	— 4.8	3	12.0	50.9	29.0	28	8.0	6	60.8	10.9	3.68	+0.45	5,785	w.	41	e.	10	7	5	11	12
Mount Washington	6,279	23.25	.....	29.87	30.35	15	29.26	10	1.09	0	6	—6.2	32.2	10	.....	—38.0	2	—9.8	70.2	49.0	10	8.6	6	90.2	1.3	1.87	—2.28	*	nw.	‡	se.	16	9	0	10	18
Thatcher's Island	48	.....	.....	.....	.....	...	.....	...	.....	22.8	—7.7	47.4	28	30.5	— 1.3	3	15.1	48.7	.....	.....	.....	...	.....	.....	.....	3.08	—0.97	.....	.....	.....	...	9	...	...
Boston	122	29.78	—.19	29.92	30.41	24	29.01	10	1.40	20.5	—8.3	51.5	10	28.7	0.8	12	12.6	50.7	38.7	10	5.9	27	60.6	10.8	3.00	—0.68	9,244	w.	54	e.	16	10	6	10	12
Point Judith	.....	.....	.....	.....	.....	...	.....	...	.....	23.0	.....	49.0	10	31.0	4.0	11	15.1	45.0	.....	.....	.....	...	.....	.....	.....	1.57	.....	.....	.....	.....	...	9	...	...
Block Island	27	29.91	.....	29.94	30.44	24	29.06	10	1.37	24.2	—9.1	53.0	10	31.9	6.6	11	18.1	46.4	33.3	10	7.0	18	79.8	18.9	3.68	—3.79	11,923	nw.	52	ne.	15	11	2	17	9
Narragansett Pier	.....	.....	.....	.....	.....	...	.....	...	.....	22.5	.....	45.0	10	31.2	0.0	12	13.7	48.0	.....	.....	.....	...	.....	.....	.....	1.75	.....	.....	.....	.....	...	13	...	...
New London	47	29.92	—.18	29.97	30.44	24	29.06	10	1.39	22.7	—7.7	43.6	10	30.5	2.0	11	14.9	41.6	27.8	10	9.5	13	70.4	14.4	4.03	+0.40	6,141	w.	48	e.	16	10	3	12	13
New Haven	107	29.85	.....	29.97	30.46	24	29.10	10	1.37	19.7	—10.4	51.2	10	29.0	— 1.6	11	12.2	52.8	38.9	10	6.3	4	77.6	13.7	3.15	—1.19	6,391	n.	50	e.	16	12	3	14	11
Middle Atlantic states.																																	
Albany	75	29.91	—.14	30.01	30.50	24	29.15	10	1.35	14.6	—11.6	45.4	10	25.4	—10.0	7	5.1	55.4	38.1	10	10.2	13	73.5	7.6	1.38	—1.46	4,491	n.	34	s.	16	9	8	14	6
New York City	104	29.80	—.18	29.99	30.49	24	29.09	10	1.40	23.1	—8.1	51.4	16	31.3	0.0	11	16.1	51.4	32.7	10	7.1	20	78.0	17.2	6.09	+2.73	8,605	nw.	41	nw.	16	13	6	13	9
Sandy Hook	28	29.96	—.17	29.99	30.52	24	29.10	10	1.41	25.2	—7.4	53.2	10	32.4	1.5	11	17.5	51.7	40.0	10	7.2	27	74.6	18.2	4.54	+0.90	13,719	nw.	56	w.	11	15	9	14	5
Barnegat City	22	29.96	—.17	29.98	30.51	24	29.11	10	1.40	27.0	—6.4	54.2	10	35.4	4.7	11	19.8	49.5	37.1	10	5.6	25	80.4	21.8	1.47	—2.50	11,714	nw.	58	se.	16	11	7	13	8
Little Egg Harbor	.....	.....	.....	.....	.....	...	.....	...	.....	26.3	.....	45.4	10	33.3	3.2	11	19.3	42.2	.....	.....	.....	...	.....	.....	.....	1.44	.....	.....	.....	.....	...	11	...	...
Atlantic City	13	29.95	—.19	29.96	30.49	24	29.15	10	1.34	25.7	—8.4	48.1	1	33.2	5.0	11	18.3	43.1	31.5	10	6.6	27	80.5	20.5	2.00	—1.46	6,421	nw.	40	e.	16	15	4	16	7
Cape May	27	29.95	.....	29.98	30.48	24	29.24	10	1.25	29.0	—6.6	53.0	9	38.5	4.5	11	22.3	48.5	35.0	10	7.0	27	77.8	23.5	3.71	—0.09	12,403	nw.	55	nw.	10	11	6	16	6
Philadelphia	117	29.87	—.18	30.00	30.53	24	29.10	10	1.43	23.4	—10.9	56.1	10	.....	.....	...	.....	.....	.....	...	7.1	5	15.3	2.79	—0.41	7,038	nw.	37	nw.	10	15	5	15	8
Baltimore	45	29.98	—.17	30.02	30.51	24	29.29	9	1.22	28.5	—9.1	50.4	28	35.5	3.4	11	22.2	47.0	35.8	10	6.9	14	03.4	17.3	4.40	+1.16	4,437	nw.	26	nw.	10	15	6	15	7
Washington City	100	29.91	—.10	30.03	30.52	24	29.21	10	1.31	26.9	—9.4	51.5	28	34.4	2.4	11	19.6	49.1	27.4	10	5.2	14	72.2	18.6	4.63	+1.49	4,732	nw.	30	nw.	10	15	10	10	8
Delaware Breakwater	20	29.98	—.17	30.00	30.53	24	29.20	10	1.33	28.4	—10.2	51.7	9	35.4	9.0	21	22.8	42.7	20.7	10	5.1	27	74.6	21.2	1.91	—1.32	12,207	nw.	52	ne.	15	11	9	14	5
Ocean City	.....	.....	.....	.....	.....	...	.....	...	.....	29.3	.....	55.9	8	37.0	7.2	21	21.7	48.7	.....	.....	.....	...	.....	.....	.....	2.39	.....	.....	.....	.....	...	12	...	...
Chincoteague	8	29.98	—.19	29.99	30.50	24	29.17	10	1.32	31.5	—7.7	55.0	4	39.1	8.0	11	23.9	47.0	31.7	10	3.6	13	80.9	26.1	2.00	—2.23	9,112	nw.	52	nw.	1	13	11	11	6
Cape Henry	16	29.98	—.18	30.00	30.52	24	29.23	10	1.29	35.5	—7.7	66.0	4	43.5	13.6	11	29.1	52.4	40.6	10	3.7	20	73.0	27.3	3.73	+0.14	9,379	n.	47	nw.	6	13	9	11	8
Norfolk	30	29.99	—.16	30.02	30.50	23	29.29	10	1.21	37.2	—6.2	65.8	9	44.9	14.4	21	29.8	51.4	34.3	10	4.3	25	72.7	28.9	3.79	—0.11	5,579	n.	30	w.	10	14	10	8	10
Lynchburg	652	29.28	—.18	30.00	30.51	23	29.33	9	1.18	31.6	—9.7	60.8	3	40.3	3.7	11	23.8	57.1	31.7	28	3.8	14	69.0	22.1	3.49	—0.02	2,911	sw.	30	nw.	1	13	8	12	8
South Atlantic states.																																	
Kitty Hawk	22	29.99	—.20	30.00	30.51	24	29.29	10	1.22	39.0	—5.4	64.0	9	46.2	15.1	21	31.2	48.9	31.2	10	4.9	27	75.2	31.4	6.17	+2.42	11,135	n.	56	n.	14	14	9	9	10
Hatteras	12	29.98	—.19	29.99	30.49	24	29.35	10	1.14	41.2	—6.5	64.5	9	49.1	20.5	21	34.7	44.0	30.1	25	5.5	27	78.6	34.8	4.50	—0.75	9,210	n.	36	nw.	10	10	7	10	11
Fort Macon	11	30.00	—.18	30.01	30.50	24	29.39	10	1.10	41.5	—8.3	60.0	25	48.1	18.3	11	34.0	41.7	24.3	10	5.2	13	79.8	35.6	2.99	—0.11	10,060	sw.	52	w.	4	12	10	6	10
New River Inlet	.....	.....	.....	.....	.....	...	.....	...	.....	41.9	.....	63.5	8	50.9	13.4	21	32.9	50.1	.....	.....	.....	...	.....	.....	.....	3.85	.....	.....	.....	.....	...	12	...	...
Wilmington	52	29.96	—.17	30.02	30.48	23	29.34	5	1.13	45.1	—5.1	69.5	10	54.1	20.0	21	36.6	49.5	27.2	3	8.2	6	64.5	32.8	2.52	—0.93	5,189	nw.	31	w.	10	11	10	9	9
Smithville	34	29.93	—.18	30.03	30.49	23	29.15	5	1.15	42.5	—7.7	61.7	9	49.1	16.5	21	34.5	44.0	28.1	10	6.2	13	74.8	34.6	1.70	—1.38	7,110	no.	32	nw.	16	10	9	8	11
Charlotte	808	29.15	—.15	30.04	30.52	23	29.40	9	1.11	38.5	—8.6	65.2	28	47.4	12.0	11	30.7	53.2	40.2	10	8.2	8	69.9	28.8	4.54	—0.11	3,868	sw.	27	nw.	10	10	7	12	9
Atlanta	1,129	28 85	—.13	30.07	30.42	23	29.49	5	0.93	39.5	—9.5	69.0	9	48.1	8.0	11	30.3	61.0	27.0	18	4.7	8	61.8	26.2	4.14	—1.85	7,021	nw.	32	nw.	10	10	6	11	11
Augusta	183	29.89	—.13	30.09	30.52	23	29.47	5	1.05	42.8	—8.5	73.9	28	54.5	14.7	11	33.7	59.2	39.3	28	5.1	24	68.4	30.9	3.24	—0.74	3,270	w.	20	w.	10	12	9	4	15
Charleston	52	29.97	—.16	30.03	30.46	23	29.41	5	1.05	47.5	—5.7	67.2	3	55.2	22.0	11	40.7	45.2	27.6	10	7.1	13	74.9	39.2	3.64	—0.03	5,692	sw.	36	sw.	25	11	9	7	12
Savannah	87	29.96	—.15	30.05	30.44	23	29.39	5	1.05	49.6	—5.1	71.0	10	58.5	22.5	11	41.5	48.5	30.8	10	7.8	13	66.5	37.4	3.11	+0.05	5,385	nw.	40	w.	5	11	6	10	12
Jacksonville	43	30.01	—.13	30.06	30.35	11	29.58	5	0.78	54.3	—4.3	73.7	18	63.3	32.1	11	46.6	41.2	25.1	10	9.0	25	73.4	45.0	5.23	+1.80	4,818	no.	40	w.	5	9	6	11	11
Cape Lookout	.....	.....	.....	.....	.....	...	.....	...	.....	42.3	.....	63.7	10	50.7	16.2	21	33.9	47.5	.....	.....	.....	...	.....	.....	.....	2.48	.....	.....	.....	.....	...	9	...	...
Portsmouth	.....	.....	.....	.....	.....	...	.....	...	.....	43.2	.....	65.0	10	51.0	20.0	21	35.3	45.0	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	...	8	...	...
Florida peninsula.																																	
Sanford	50	30.04	.....	30.08	30.36	11	29.67	5	0.96	58.5	.....	81.5	9	69.4	38.0	11	49.3	43.5	30.1	7	8.3	13	72.4	48.3	3.96	.....	4,538	n.	24	sw.	6	11	8	12	8
Cedar Keys	22	30.04	—.12	30.06	30.31	2	29.65	5	0.66	54.9	—7.4	71.0	24	61.9	33.8	11	49.3	37.2	22.1	12	3.1	25	72.5	45.3	9.62	+5.32	6,233	n.	35	w.	14	9	3	9	16
Key West	20	30.04	—.08	30.06	30.29	3	29.83	13	0.46	68.2	—3.5	82.0	25	73.2	55.6	14	63.8	26.4	15.3	10	2.8	27	79.3	61.3	4.07	+2.24	8,708	no.	36	nw.	10	15	5	13	10
Eastern Gulf states.																																	
Montgomery	219	29.84	—.10	30.08	30.46	11	29.45	5	1.07	45.4	—7.9	79.1	9	55.6	15.5	11	35.4	63.6	35.9	9	6.5	24	67.5	34.0	3.68	—1.83	4,434	n.	27	w.	9	11	9	9	10
Pensacola	30	30.04	—.10	30.07	30.45	11	29.59	5	0.86	50.7	—7.7	69.5	4	59.1	24.0	11	42.6	45.5	20.7	10	7.5	13	67.9	39.2	3.20	—1.28	5,869	n.	32	sw.	5	9	5	13	10
Mobile	35	30.04	—.08	30.08	30.45	2	29.55	5	0.90	48.3	—6.6	70.7	9	58.3	27.6	11	40.2	49.1	31.8	9	6.2	13	71.5	38.0	2.85	—1.65	5,570	n.	32	sw.	5	12	7	10	11
Vicksburg	244	29.84	—.05	30.11	30.45	2	29.60	9	0.85	46.7	—6.6	73.3	8	56.2	17.2	11	36.7	56.1	38.4	9	7.0	13	66.5	35.3	3.93	—1.39	4,547	nw.	24	nw.	9	7	8	9	11
New Orleans	52	30.01	—.07	30.07	30.42	11	29.61	9	0.81	53.1	—5.4	75.3	9	60.8	30.0	11	45.8	45.3	32.1	9	6.4	13	66.5	41.3	2.39	—1.88	5,801	n.	26	w.	9	11	8	9	11
Western Gulf states.																																	
Fort Smith	470	29.57	—.11	30.07	30.53	10	29.63	7	0.90	35.8	—7.0	74.1	27	49.7	1.0	10	25.0	73.1	44.0	27	6.4	24	72.2	26.8	1.69	—1.58	4,294	e.	26	nw.	9	6	5	14	9
Little Rock	298	29.75	—.05	30.08	30.43	10	29.64	9	0.80	41.6	—6.4	72.3	28	52.0	10.2	10	31.4	62.1	38.4	17	11.6	23	74.0	33.3	2.43	—6.23	4,681	nw.	24	s.	7	8	3	18	7
Shreveport	227	29.84	—.04	30.09	30.49	10	29.61	8	0.88	45.0	—6.8	77.6	8	59.3	14.6	10	35.4	63.0	42.2	9	7.1	13	65.1	32.8	3.31	—1.89	5,068	s.	28	nw.	9	7	6	13	9
Palestine	533	29.53	—.05	30.11	30.50	10	29.65	8	0.85	45.0	—6.5	76.6	8	57.1	14.6	10	36.1	62.0	31.9	9	5.8	13	62.0	31.5	3.02	+0.06	7,054	s.	31	s.	7	0	7	9	12
Indianola	26	30.04	—.03	30.07	30.44	10	29.65	8	0.79	51.7	—6.5	72.6	8	58.8	25.5	10	44.3	47.1	28.5	10	2.2	13	82.1	45.9	1.69	—0.14	11,607	n.	47	sw.	7	6	7	9	12
Galveston	40	30.03	—.05	30.07	30.42	2	29.68	8	0.74	52.6	—4.9	70.0	8	60.2	28.0	10	45.8	42.0	29.0	9	8.0	20	79.5	46.0	2.04	—0.88	8,672	n.	36	n.	9	7	10	6	12
Rio Grande valley.																																	
Rio Grande City	230	29.86	+.01	30.11	30.42	2	29.74	8	0.68	56.0	—7.8	87.2	8	65.4	33.0	14	48.0	54.2	35.6	16	2.0	21	69.7	44.0	1.12	+0.26	3,827	n.	23	nw.	15	7	10	9	9
Brownsville	57	29.98	—.05	30.04	30.37	2	29.70	9	0.68	57.1	—5.2	81.8	4	67.3	34.8	10	49.4	47.0	27.2	16	5.2	25	82.7	51.1	2.52	+0.62	5,741	n.	29	n.	9	11	12	9	7
Tennessee.																																	
Nashville	549	29.46	—.03	30.07	30.47	23	29.46	9	1.01	33.4	—10.6	70.4	28	42.8	— 0.8	11	23.0	71.2	44.3	9	5.1	25	74.7	25.8	2.00	—3.58	5,149	nw.	32	nw.	15	9	6	18	4
Memphis	321	29.72	—.08	30.07	30.44	20	29.53	9	0.91	39.0	—6.4	68.0	28	47.4	9.9	11	30.7	58.1	34.9	17	8.6	10	66.2	28.3	1.88	—3.92	4,530	nw.	28	nw.	5	7	6	11	11
Chattanooga	783	29.22	- .12	30.06	30.46	23	29.46	9	0.99	38.4	—8.2	68.8	9	48.1	6.2	11	28.6	62.6	37.1	9	10.8	15	72.6	29.9	3.50	—2.20	4,834	sw.	30	nw.	9	15	8	10	10
Knoxville	980	.....	.....	.....	.....	...	.....	...	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	...	...
Ohio valley.																																	
Pittsburg	766	29.14	—.15	30.00	30.55	23	29.25	9	1.30	24.0	—9.2	52.3	9	33.2	— 8.8	11	13.9	61.6	51.8	10	5.1	26	77.9	17.9	1.90	—0.77	4,768	w.	26	w.	10	20	13	12	3
Columbus	805	29.12	—.12	30.02	30.57	23	29.25	9	1.32	19.4	—15.3	53.0	28	29.5	—11.0	11	9.2	64.0	36.0	16	6.8	26	82.6	14.8	2.39	—1.72	5,702	w.	35	w.	10	11	10	9	9
Indianapolis	753	29.19	—.08	30.04	30.58	23	29.37	9	1.21	20.5	—13.5	59.0	28	29.4	— 9.0	11	11.0	68.0	29.4	7	6.1	26	83.7	16.1	1.54	—2.23	3,424	sw.	23	nw.	9	13	6	14	8
Greencastle	.....	29.01	.....	.....	.....	...	.....	...	1.14	19.6	.....	60.1	28	30.6	—13.1	10	9.8	73.2	33.4	2	9.4	26	80.7	14.3	2.01	.....	5,640	sw.	23	s.	23	10	6	14	8
Cincinnati	620	29.37	—.10	30.06	30.61	23	29.32	9	1.29	23.2	—15.2	62.3	28	33.2	— 9.6	11	13.6	71.9	35.6	28	4.1	26	71.6	15.0	2.67	—1.41	3,863	w.	22	nw.	10	10	8	10	10
Louisville	530	29.45	—.09	30.04	30.56	23	29.39	9	1.17	29.8	—9.6	67.6	28	40.4	— 1.3	11	20.4	08.9	29.8	9	4.9	26	74.2	22.2	2.85	—1.98	5,055	sw.	30	sw.	9	8	5	16	7
Lower lake region.																																	
Detroit	661	29.25	—.11	30.00	30.56	23	29.25	9	1.31	16.6	—10.7	50.2	28	27.4	—11.6	10	6.8	61.8	44.7	16	5.8	27	68.7	8.0	1.26	—1.22	6,545	sw.	28	sw.	10	13	8	8	12
Toledo	651	29.28	—.09	30.02	30.57	23	29.29	9	1.28	17.5	—11.9	59.5	28	30.6	—15.5	11	7.4	75.0	32.4	5	10.7	4	72.0	9.8	0.61	—1.41	5,609	sw.	39	ne.	9	10	7	12	9
Sandusky	639	29.30	—.10	30.02	30.57	23	29.27	9	1.30	18.1	—13.6	49.5	28	27.3	—14.9	11	8.0	64.4	41.8	16	7.5	25	72.6	10.7	0.83	—2.64	8,351	sw.	42	nw.	1	13	9	10	9
Cleveland	690	29.23	—.12	30.02	30.57	23	29.17	9	1.40	16.4	—12.4	46.7	28	26.2	—15.1	11	7.3	61.8	43.3	16	7.4	27	83.6	12.1	1.05	—1.76	6,711	w.	30	s.	15	15	8	12	8
Erie	681	29.23	—.12	30.00	30.56	23	29.13	9	1.44	19.1	—9.9	48.3	28	28.0	—12.3	11	9.5	59.6	38.3	10	8.0	20	77.1	13.1	2.10	—1.27	6,513	w.	43	s.	9	19	13	10	5
Buffalo	690	29.21	—.12	30.00	30.54	23	29.14	10	1.40	13.8	—11.6	43.4	9	23.6	—12.8	11	5.6	56.2	46.6	10	4.3	19	84.5	10.0	1.57	—0.95	7,772	sw.	56	sw.	10	15	3	10	5
Rochester	621	29.28	—.13	29.99	30.49	23	29.17	9	1.31	13.7	—11.7	45.9	10	23.9	—10.0	11	5.1	56.9	48.7	10	6.9	6	79.6	8.5	1.54	—0.94	9,157	w.	45	w.	11	8	14	11	3
Oswego	334	29.59	—.15	29.97	30.47	24	29.21	9	1.26	12.7	—14.0	37.0	28	21.6	†—7.7	11	.....	44.7	.....	...	5.7	19	80.5	9.4	1.22	—1.30	8,856	se.	39	w	10	15	15	11	2
Upper lake region.																																	
Duluth	644	29.25	—.07	30.04	30.54	22	29.53	3	1.02	4.9	—11.7	40.1	23	14.9	—32.3	10	—6.1	72.4	32.5	14	10.8	3	73.6	—1.8	0.32	—0.83	3,713	nw.	40	ne.	16	6	6	12	10
Marquette	673	.....	.....	.....	.....	...	.....	...	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	...	...
Escanaba	612	29.26	—.11	29.98	30.51	22	29.13	4	1.08	5.8	—10.9	40.6	28	15.6	—25.0	6	—5.3	65.0	35.2	2	10.4	10	68.7	—2.7	0.93	—0.47	5,201	n.	36	n.	9	13	11	12	5
Milwaukee	697	29.21	—.08	30.01	30.56	23	29.42	3	1.14	10.1	—17.4	41.0	28	19.2	—23.6	11	1.4	64.6	28.1	21	7.2	4	82.7	5.7	0.49	—1.48	6,706	w.	41	n.	9	7	10	9	9
Chicago	661	29.26	—.10	30.01	30.58	23	29.43	4	1.14	16.8	—12.3	47.2	3	20.8	—13.7	11	8.8	60.9	33.2	11	8.8	7	79.6	11.7	2.01	—0.41	4,934	sw.	24	ne.	8	11	9	9	10
Grand Haven	620	29.28	—.10	29.99	30.54	23	29.38	4	1.16	15.0	—11.5	41.2	4	24.6	— 7.2	21	7.8	48.4	29.2	14	3.9	10	78.1	9.3	1.57	—0.57	7,054	sw.	35	sw.	11	14	10	9	3
Mackinaw City	605	29.27	—.15	29.97	30.53	23	29.38	4	1.14	7.7	—6.3	43.5	28	10.7	—23.4	6	—3.0	75.9	41.0	6	5.5	9	75.9	1.5	3.59	.....	5,266	w.	23	w.	11	14	12	11	5
Alpena	609	29.24	—.14	29.95	30.50	23	29.32	4	1.18	7.7	—11.4	37.0	27	17.6	—21.0	6	2.4	60.0	35.3	16	11.2	22	75.2	1.6	1.63	—0.52	5,844	w.	32	se.	15	17	13	13	2
Port Huron	633	29.27	—.10	30.00	30.56	23	29.21	9	1.36	10.6	—13.7	42.5	28	0.32	—25.0	11	—0.4	67.5

Table of miscellaneous meteorological data for February, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure.							Temperature of the air (in degrees Fahrenheit).																Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal	Winds.				Number of days.			
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly mean.	Departure from normal.	Extremes.						Daily ranges.												Total movement.	Prevailing direction.	Max. velocity.					
					Highest barometer	Date.	Lowest barometer	Date.	Monthly range of barometer.		Max.	Date.	Mean max	Min.	Date.	Mean min	Monthly range	Greatest.	Date.	Least.	Date.										Miles p.hr	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
Extreme northwest.																																		
Fort Buford	1,930	27.95	—.05	30.16	30.62	19	29.61	16	1.01	4.6	— 4.7	46	0	2	15.2	—32.0	19	—6.0	78.0	32.4	26	10.2	27	74.8	-1.9	0.44	—0.06	6,463	w.	50	w.	3	8	9	9	10
Bismarck	1,694	28.17	—.01	30.15	30.60	19	29.64	4	0.96	3.6	— 7.8	48	1	2	14.0	—28.0	10	—6.0	76.4	39.1	1	7.5	28	88.0	0.5	0.30	—0.32	4,969	nw.	30	nw.	28	3	2	10	16
Fort Yates	.....	.....	.....	.....	.....	...	.....	...	.....	3.9	.....	56	0	28	10.6	—34.2	9	—8.8	90.2	.....	...	.....	...	.....	.....	0.73	.....	.....	.....	...	.....	...	11	.	.	...
Fort Totten	.....	28.35	.....	.....	.....	...	.....	...	1.00	-2.0	.....	39	2	27	7.6	—34.1	9	[	73.3	31.0	4	4.5	28	75.3	-7.8	0.25	.....	7,987	nw.	41	w.	27	5	5	7	16
Moorhead	923	29.02	—.06	30.12	30.55	19	29.54	3	1.01	2.9	— 4.8	50	0	27	14.6	—30.0	9	—7.1	80.0	32.0	1	8.8	6	71.1	-5.7	0.08	—0.76	5,975	nw.	29	n.	3	2	7	9	12
Saint Vincent	804	29.15	—.07	30.12	30.57	19	29.52	3	1.05	-4.2	— 8.2	38	2	27	0.1	—39.2	9	-15.	77.4	35.7	1	4.6	6	80.5	-9.0	0.10	—0.28	5,991	nw.	29	nw.	28	5	3	10	15
Upper Mississippi valley.																																		
Saint Paul	801	29.12	—.05	30.05	30.54	22	29.47	3	1.07	9.9	— 8.5	48	7	28	21.6	—24.5	10	1.0	73.2	34.7	27	10.6	7	67.1	0.3	0.20	—0.88	3,688	nw.	20	nw.	15	10	6	10	12
La Crosse	725	29.21	—.00	30.05	30.56	22	29.48	3	1.08	11.5	—11.4	43	5	28	19.9	—22.0	10	2.7	65.5	28.1	2	8.7	6	70.8	3.7	0.28	—0.90	4,321	s.	29	n.	9	7	7	13	8
Dubuque	665	29.30	.....	30.06	30.57	23	29.50	3	1.07	13.3	—11.9	48	0	28	23.0	—20.0	13	2.2	68.0	34.7	24	7.9	19	62.8	2.7	0.72	—0.87	2,526	w.	16	nw.	9	8	4	13	11
Davenport	615	29.30	—.06	30.06	30.58	23	29.54	3	1.03	17.3	—12.5	48	0	28	27.2	—17.3	13	7.9	65.3	33.8	22	9.7	19	72.1	9.7	1.20	—0.37	5,438	w.	36	n	9	8	0	10	12
Des Moines	849	29.14	—.04	30.11	30.57	22	29.58	4	0.99	14.6	—11.1	49	5	27	22.7	—20.5	10	6.0	70.0	29.9	13	6.4	14	70.6	6.8	0.42	—1.31	3,881	n.	25	n.	9	7	9	10	9
Keokuk	618	29.38	—.04	30.08	30.55	23	29.61	3	0.94	10.5	—14.1	46	3	27	25.9	—14.5	10	7.8	60.8	29.6	11	6.8	4	78.4	10.9	1.14	—0.61	5,594	nw.	27	nw.	9	8	4	11	13
Springfield	644	29.30	—.06	30.09	30.57	23	29.59	7	0.98	20.9	—13.2	54	8	28	31.2	—11.2	10	11.7	66.0	30.7	2	6.5	4	67.7	11.9	0.94	—4.75	5,562	w.	29	nw.	9	8	4	14	10
Saint Louis	583	29.44	—.07	30.09	30.57	23	29.55	7	1.02	27.0	— 8.9	68	4	3	38.2	— 5.5	10	16.7	73.9	36.5	2	10.3	4	72.5	19.1	0.87	—2.33	6,338	w.	28	nw.	9	7	0	12	10
Cairo	370	29.68	—.08	30.10	30.53	22	29.59	9	0.94	31.9	— 9.1	67	0	28	40.5	0.0	20	23.0	66.4	23.5	17	7.0	25	66.2	21.6	1.48	—3.08	6,411	nw.	44	sw.	7	6	0	12	10
Missouri valley.																																		
Fort Bennett	1,510	28.45	.....	30.18	30.62	19	29.72	4	0.90	10.7	— 6.2	50	6	2	21.4	—27.5	20	0.5	78.1	43.7	25	8.1	21	77.1	4.7	0.21	—0.53	4,219	nw.	36	nw.	28	10	8	14	6
Yankton	1,228	28.74	—.03	30.16	30.64	20	29.63	4	1.02	13.2	— 7.2	23	0	27	22.7	—18.2	20	5.1	71.2	32.0	26	5.8	8	76.2	7.0	0.43	—0.47	4,322	nw.	27	n.	3	7	5	13	10
Huron	1,305	28.63	—.05	30.15	30.58	19	29.62	4	0.97	7.2	— 6.7	49	8	27	18.8	—24.5	16	—2.6	74.3	35.6	26	6.7	28	70.7	—0.5	0.22	—0.21	4,486	nw.	28	nw.	3	5	8	8	12
Omaha	1,113	28.88	—.03	30.15	30.59	19	29.66	4	0.90	16.6	—10.8	52	6	27	.....	—17.9	10	8.9	70.5	.....	..	.....	...	74.2	9.8	0.47	—0.38	5,884	n.	30	n.	9	8	5	13	10
Leavenworth	842	29.16	—.05	30.11	30.52	20	29.58	7	0.94	21.6	—11.0	57	0	0	32.4	—10.2	10	12.8	73.2	35.8	11	8.0	23	79.8	15.9	0.87	—0.71	3,972	s.	23	nw.	9	11	0	13	9
Northern slope.																																		
Fort Assiniboine	2,710	27.11	—.04	30.16	30.62	9	29.57	16	1.05	17.5	+ 4.1	51	5	26	27.5	—16.7	9	8.6	68.2	43.2	24	7.0	4	73.0	9.7	0.78	+0.28	6,676	sw.	47	sw.	2	8	13	12	3
Fort Benton	2,700	27.18	.....	30.16	30.62	9	29.52	16	1.11	23.2	+ 3.7	58	4	26	35.4	—20.8	10	13.3	79.2	40.3	10	9.5	4	65.8	12.7	0.60	+0.29	5,134	sw.	40	w.	16	12	12	12	4
Fort Shaw	3,550	26.27	.....	30.12	30.51	9	29.50	16	0.95	23.8	+ 4.1	54	1	26	34.0	—15.6	10	13.7	69.7	41.7	10	8.7	3	76.0	17.3	0.78	+0.32	7,511	w.	44	sw.	16	15	7	16	5
Helena	4,044	25.75	—.00	30.10	30.47	28	29.77	16	0.70	28.2	+ 8.5	53	2	26	37.4	— 4.2	10	21.7	57.4	32.0	16	8.2	5	65.4	17.7	0.82	+0.08	3,604	w.	40	w.	4	13	15	11	2
Fort Custer	3,040	26.79	+.02	30.15	30.54	9	29.74	16	0.80	22.5	+ 2.1	53	2	2	32.6	—21.0	10	10.8	74.2	40.2	24	8.5	4	74.9	15.2	0.16	—0.41	4,803	w.	48	nw.	16	7	7	17	4
Poplar River	2,030	27.85	.....	30.20	30.63	9	29.54	16	1.09	0.7	.....	44	4	26	11.6	—50.2	9	[	90.0	37.9	25	11.1	15	92.8	-0.9	0.64	.....	2,952	w.	26	w.	3	8	9	8	11
Fort Maginnis	4,340	25.45	.....	30.20	30.50	28	29.66	16	0.84	22.1	.....	51	0	2	30.8	—17.0	9	13.0	68.0	41.0	19	7.4	7	51.0	6.4	1.04	.....	10,410	w.	64	w.	16	16	12	12	4
Deadwood	4,000	25.23	—.03	30.15	30.42	28	29.70	16	0.72	21.8	— 2.2	56	0	2	31.0	—15.0	10	13.0	71.0	33.5	10	8.0	5	74.0	14.4	2.88	+1.93	2,451	ne.	15	e.	22	19	6	17	5
Cheyenne	6,089	23.86	—.05	30.12	30.48	1	29.80	13	0.69	24.6	— 2.8	51	7	1	34.5	—12.5	10	14.3	64.2	30.1	11	10.9	23	71.0	15.5	1.31	+1.17	9,325	nw.	56	nw.	4	10	5	13	10
North Platte	2,841	27.04	—.04	30.14	30.46	19	29.65	10	0.82	19.8	— 6.5	50	0	5	29.9	—22.0	10	10.4	72.2	36.4	16	5.0	22	75.7	13.3	0.16	—0.23	4,313	w.	28	sw.	3	12	5	12	11
Middle slope.																																		
Denver	5,294	24.62	—.05	30.14	30.50	25	29.29	13	0.71	32.4	+ 0.7	60	4	27	44.4	0.7	10	20.9	60.2	37.6	11	11.9	23	63.8	19.8	0.75	+0.29	6,090	s.	64	w.	4	9	2	15	11
Pike's Peak	14,134	17.50	.....	30.22	30.64	1	29.85	14	0.79	1.9	— 1.7	18	5	2	7.0	—24.0	9	—3.0	42.5	22.0	8	5.5	1	82.8	—2.2	3.91	+2.30	11,611	nw.	76	nw.	11	14	6	11	11
Dodge City	2,517	27.39	—.03	30.13	30.45	9	29.65	7	0.80	25.8	— 7.5	60	1	6	38.0	— 5.2	10	15.1	65.3	35.1	26	8.5	9	75.8	18.5	0.47	—0.08	7,233	w.	36	n.	14	4	3	9	16
West Las Animas	3,905	25.95	—.07	30.07	30.43	28	29.59	14	0.84	27.7	+ 0.8	68	0	6	44.5	— 5.3	11	15.2	73.3	34.5	16	7.9	23	75.8	19.5	0.32	—0.03	4,536	e.	46	n.	4	5	4	14	10
Fort Elliott	2,650	27.22	—.04	30.12	30.40	10	29.67	14	0.73	32.2	— 7.3	71	6	27	43.7	— 2.3	9	21.7	73.9	37.1	27	8.0	23	71.9	22.6	0.87	+0.52	6,716	n.	48	nw.	4	4	3	10	15
Southern slope.																																		
Fort Sill	1,200	.....	.....	.....	.....	...	.....	...	.....	.....	.....	...	...	...	...	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	...	...
Fort Concho	1,900	28.10	—.06	30.12	30.46	10	29.66	8	0.80	43.7	— 4.7	80	3	28	59.9	11.2	10	31.8	69.1	43.8	9	7.1	23	66.1	31.3	0.41	—0.83	6,645	e.	41	n.	5	5	3	13	12
Fort Stockton	3,010	20.96	—.05	30.10	30.41	2	29.76	8	0.66	47.3	— 1.3	84	0	28	04.1	12.8	10	33.4	71.2	44.6	4	13.5	20	57.5	30.7	0.91	+0.34	5,596	sw.	33	w.	14	5	1	9	18
Fort Davis	4,928	25.11	.....	30.06	30.37	2	29.77	12	0.61	47.9	— 0.5	75	3	28	02.3	10.8	13	33.5	58.5	41.2	19	14.5	25	42.2	24.4	0.28	+0.11	.....	sw.	...	sw.	14	2	1	9	18
Southern plateau.																																		
Prescott	5,389	24.70	+.01	30.12	30.42	3	29.82	7	0.60	40.2	+ 3.5	66	5	4	55.6	14.3	13	26.3	55.2	39.2	18	9.5	23	56.7	23.6	0.46	—0.99	3,730	s.	42	s.	7	3	2	6	20
Wickenburg	.....	.....	.....	.....	.....	...	.....	...	.....	51.6	+ 3.0	78	5	3	70.8	22.0	9	32.4	50.5	.....	...	.....	...	.....	.....	0.33	—0.87	.....	.....	...	.....	...	3	...	...	...
Fort Grant	4,856	25.18	.....	30.04	30.31	1	29.80	23	0.50	45.8	0.0	72	7	27	00.1	25.3	10	35.3	47.4	35.0	18	12.1	24	46.4	24.2	1.02	—0.42	4,748	w.	32	w.	8	3	3	2	23
Fort Thomas	2,710	27.22	.....	30.05	30.34	1	29.75	8	0.60	46.0	— 0.8	72	5	4	03.3	19.7	10	29.3	52.8	41.5	4	12.0	8	53.1	27.3	1.00	—0.40	.....	w.	...	.....	...	3	3	3	22
Fort Apache	5,050	25.01	.00	30.11	30.40	2	29.79	8	0.60	39.6	+ 1.3	66	9	6	57.9	11.8	10	24.2	55.1	43.0	4	14.7	24	65.0	27.0	1.00	—1.00	3,764	ne.	30	sw.	7	4	3	7	18
Fort Bowie	.....	.....	.....	.....	.....	...	.....	...	.....	50.8	.....	77	5	6	05.0	25.0	13	36.5	52.5	.....	...	.....	...	.....	.....	1.81	.....	.....	.....	...	.....	...	4	...	...	...
Willcox	.....	.....	.....	.....	.....	...	.....	...	.....	50.4	.....	76	0	4	70.9	12.5	15	30.0	63.5	.....	...	.....	...	.....	.....	0.63	.....	.....	.....	...	.....	...	2	...	...	...
El Paso	3,704	26.21	—.05	30.09	30.45	1	29.81	8	0.64	49.9	— 0.4	76	1	10	00.5	26.0	2	35.9	50.1	43.4	27	19.4	25	34.7	19.0	0.03	—0.49	3,622	w.	29	sw.	8	3	1	10	17
Santa Fé	.....	23.16	.....	.....	.....	...	.....	...	0.72	32.2	+ 0.2	56	0	19	43.3	3.0	9	23.0	53.0	27.0	10	0.0	23	55.5	16.9	0.53	—0.11	5,749	n.	20	nw.	14	6	4	11	13
Middle plateau.																																		
Salt Lake City	4,348	25.65	—.01	30.21	30.59	28	29.87	6	0.72	36.1	+ 4.3	51	2	26	42.8	21.9	9	31.0	29.3	19.6	26	7.4	8	69.0	26.8	1.55	+0.22	2,378	se.	24	s.	14	15	14	10	4
Fort Bridger	.....	.....	.....	.....	.....	...	.....	...	.....	26.5	.....	40	3	6	34.4	4.0	9	18.5	42.3	.....	...	.....	...	.....	.....	0.40	.....	.....	.....	...	.....	...	14	...	...	...
Winnemucca	.....	25.70	.....	.....	.....	...	.....	...	0.55	40.4	+ 0.4	58	1	5	49.2	10.3	8	31.7	47.8	28.5	25	8.5	10	59.9	20.7	1.41	+0.12	5,310	sw.	32	sw.	18	8	7	13	8
Northern plateau.																																		
Dayton	1,667	28.31	.....	30.13	30.52	28	29.83	16	0.68	42.1	+13.0	66	0	19	49.0	22.8	10	35.7	43.2	24.6	28	6.5	6	77.0	34.8	3.74	—0.30	4,837	sw.	25	sw.	16	13	12	12	4
Lewiston	780	29.26	.....	30.12	30.58	28	29.72	16	0.86	39.4	+ 9.0	58	0	4	40.9	23.0	12	33.1	35.0	21.0	4	6.0	12	75.9	32.0	2.88	+1.03	1,051	ne.	39	nw.	27	11	7	17	4
Spokane Falls	1,910†	27.99	.....	30.12	30.54	28	29.70	16	0.84	36.6	.....	54	1	19	43.3	20.0	10	30.4	34.1	21.9	19	6.6	26	84.5	32.2	2.27	.....	3,717	sw.	32	sw.	16	15	12	12	4
Cœur d'Alene	.....	.....	.....	.....	.....	...	.....	...	.....	32.6	.....	65	0	3	39.8	12.0	9	25.3	53.0	.....	...	.....	...	.....	.....	2.34	.....	.....	.....	...	.....	...	16	...	...	...
Boisé City	2,750	27.25	.....	30.21	30.61	28	29.87	13	0.74	38.4	+ 5.2	58	7	26	46.0	13.2	1	32.0	45.5	29.1	2	4.1	6	79.7	32.4	2.29	+0.53	2,614	nw.	20	nw.	13	17	16	7	5
North Pacific coast region.																																		
Astoria	.....	.....	.....	.....	.....	...	.....	...	.....	46.2	.....	56	0	5	50.8	34.0	22	41.6	22.0	.....	...	.....	...	.....	.....	10.59	.....	.....	.....	...	.....	...	24	...	...	...
Olympia	36	30.02	—.03	30.06	30.45	27	29.69	18	0.76	45.1	+ 6.7	58	3	2	51.2	30.0	7	39.8	28.3	22.5	28	4.5	12	88.3	41.7	7.67	—2.07	2,215	s.	17	w.	11	15	18	5	5
Portland	67	30.03	—.02	30.10	30.48	27	29.77	18	0.72	47.1	+ 5.6	59	2	4	53.2	31.5	23	41.7	27.7	19.5	25	5.0	19	81.7	41.6	6.72	—1.14	2,177	s.	18	w.	26	23	24	3	1
Roseburg	543	29.60	.....	.....	.....	...	.....	...	0.05	48.0	+ 6.6	67	4	1	55.6	29.4	23	42.3	38.0	28.3	28	5.9	3	82.5	42.4	5.26	+0.53	1,323	s.	14	se.	2	21	18	8	2
Fort Canby	179	29.89	.....	30.09	30.52	27	29.71	1	0.80	45.7	.....	58	0	28	49.1	35.0	22	41.6	23.0	19.8	28	3.6	11	92.0	43.3	11.20	.....	10,235	s.	68	s.	2	23	12	11	5
Neah Bay	.....	.....	.....	.....	.....	...	.....	...	.....	.....	.....	56	0	1	.....	31.0	22	.....	25.0	.....	...	.....	...	.....	.....	18.50	.....	.....	.....	...	.....	...	25	...	...	...
Pysht	.....	.....	.....	.....	.....	...	.....	...	.....	43.9	.....	58	0	19	49.6	28.0	22	38.2	30.0	.....	...	.....	...	.....	.....	12.37	.....	.....	.....	...	.....	...	25	...	...	...
Tatoosh Island	.....	29.91	.....	30.01	30.48	27	29.56	18	0.93	44.9	.....	55	3	1	48.2	34.2	18	41.6	21.1	14.3	18	2.5	15	87.2	41.3	13.28	.....	10,549	e.	43	s.	3	24	21	5	2
Middle Pacific coast region.																																		
Cape Mendocino	637	29.46	.....	30.16	30.45	9	29.71	1	0.74	49.2	.....	66	3	28	53.6	40.0	8	45.4	26.3	20.0	28	3.2	22	84.2	44.4	1.37	.....	16,404	n.	¶	se.	2	11	7	11	10
Red Bluff	332	29.80	+.03	30.17	30.44	4	29.90	22	0.54	53.5	+ 5.2	73	0	28	02.9	34.5	9	44.1	38.5	28.5	28	7.0	18	68.7	41.5	1.19	—3.28	4,148	n.	28	s.	2	9	3	10	15
Sacramento	05	30.06	+.01	30.14	30.43	3	29.86	22	0.57	54.0	+ 4.8	70	0	27	62.5	39.8	9	46.4	30.2	21.5	17	8.0	5	73.8	45.2	0.49	—3.34	4,851	nw.	31	nw.	23	6	2	8	8
San Francisco	60	30.09	+.02	30.16	30.45	3	29.91	22	0.54	54.4	+ 2.6	69	0	28	60.3	46.5	9	50.3	22.5	17.0	28	5.4	18	79.6	47.6	0.30	—3.86	4,336	w.	28	w.	6	6	4	12	12
South Pacific coast region.																																		
Los Angeles	371	29.69	—.04	30.09	30.31‡	3	29.79	22	0.51	56.6	+ 3.1	81	0	5	69.7	36.3	13	44.4	44.7	35.4	3	13.9	17	66.3	43.3	0.01	—4.29	3,768	ne.	26	n.	8	0	1	11	16
San Diego	67	29.98	—.06	30.05	30.29	3	29.82	22	0.46	55.4	+ 1.2	76	0	5	64.1	39.5	14	45.9	36.5	27.6	5	6.1	22	77.7	48.0	0.02	—2.59	3,462	w.	20	nw.	8	1	1	8	19
Yuma	141	.....	.....	.....	.....	...	.....	...	.....	.....	.....	...	...	...	...	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	...	...

* Total wind movement on Mount Washington (22,615) insufficient on account of frost work. † Reading of exposed thermometer at 7 a. m. NOTE.—At Fort Elliott, Texas, the record of temperature and temperature ranges is from 17th to 28th. ‡ 108 miles. ‖ Mean minimum —10.3. ‡ Mean minimum —10.3. ¶ 104 miles.

from 7.30 to 11 p. m., extending from 15° west, to 5° east of north, and to an altitude of 30°.

Duluth, Minnesota, 5th: a pale green auroral light with occasional streamers, was visible from 9.30 to 11.25 p. m.

Escanaba, Michigan, 5th: a bright yellow auroral light above a dark segment was observed from 6.47 p. m. until the early morning of the 6th.

Fort Maginnis, Montana, 5th: at 8.30 p. m., an auroral light covered the horizon to an altitude of 10°; the light was of a purple tinge and remained stationary until 11 p. m. when it was obscured by clouds.

Fort Benton, Montana, 5th: a luminous band at an altitude of 20° and extending from northwest to northeast, was observed in the north, from dark until midnight. An auroral display was also observed from 11 p. m., of the 11th, until 1 a. m. of the 12th, when it was obscured by clouds.

The display of the 5th was also noted at the following stations: Hartford, North Colebrook, and Southington, Connecticut; Burlington, Vermont; Contoocook, New Hampshire; Cambridge, Massachusetts; Toronto, Ontario; Wauseon, Ohio; Ann Arbor, Lansing, Manistique, Swartz Creek and Traverse City, Michigan; Embarras and Wausau, Wisconsin.

Gardiner, Maine, 11th: a faint aurora became visible about midnight; at 12.45 a. m. of the 12th, a brilliant arch and shooting beams were observed; the display was still visible at 4.50 a. m., though much less brilliant. Another display was observed during the night of the 21–22d.

Eastport, Maine, 11th: a faint auroral arch of 25° altitude was observed from 9 p. m. until 3 a. m. on the 12th.

Portland, Maine, 11th: a brilliant display of the aurora was observed 9 p. m. until 2 a. m. of the 12th; the display consisted of an arch covering 80° of the horizon; streamers of varying brilliancy and length appeared at intervals, some of them reaching nearly to the North star. The auroral light was of greenish tinge and the display was characterized by two periods of maximum brilliancy, viz: 11 p. m. and 1 a. m.

Thatcher's Island, Massachusetts, 11: a brilliant aurora was observed from 9.11 to 11.30 p. m.

Rochester, New York, 11th: a faint aurora extending from northwest to northeast and to an altitude of 35°, was visible from 10.15 to 11.15 p. m.

Oswego, New York, 11th: a faint auroral light of straw color was visible from 9.50 p. m. until 12.30 a. m., on the 12th.

Sandusky, Ohio, 11th: a faint aurora was observed in the north from 10 to 10.30 p. m.

Marquette, Michigan, 11th: an auroral arch of irregular form was observed from 8.30 to 11 p. m.; streamers tinged with red arose from the western end of the arch.

Moorhead, Minnesota, 11th: a well-defined auroral arch of 8° altitude, and extending from northwest to northeast was noted at 10.30 p. m.; the arch disappeared at 11 p. m., leaving a few faint streamers which faded away at 11.30 p. m.

Fort Totten, Dakota, 11th: an auroral display was visible from 9 p.m. until the early morning of the 12th, being partly obscured by clouds.

Fort Buford, Dakota, 11th: an auroral display consisting of a partial arch extending from north-northwest to north-northeast was first noted at 8.10 p. m.; at 8.30 the arch was completely formed, and at 8.45 small streamers extended upward to an altitude of 70°; at midnight the display had disappeared.

Saint Vincent, Minnesota, 11th: at 8.50 p. m. a faint auroral glow appeared in the north; at 9.45 a bright arch formed, extending over 110° of the horizon and having an altitude of 30°; the display was brightest at 10.30 p. m., when "merry dancers" were observed; at 11 p. m. a well-defined beam, 2° in width, extended from the eastern to the western horizon, passing through the zenith; the display continued until the early morning of the 12th. From 8 p. m of the 17th until the early morning of the 18th an indistinct auroral arch was visible; occasional flashes of light were also observed.

Bismarck, Dakota, 11th: an aurora was visible from 8.20 to 9.10 p. m.; no streamers were observed.

La Crosse, Wisconsin, 11th: an auroral display, consisting of two bands of whitish light, was observed from 8 to 11.30 p. m.

Huron, Dakota, 11th: a brilliant auroral arch was observed from 8.30 p. m. until midnight.

Yankton, Dakota, 11th: from 11 p. m. until the early morning of the 12th an aurora in the form of an arch was visible.

Webster, Dakota, 11th: at 7.30 p. m. an auroral light covered nearly one-half of the sky, and streamers extended to the zenith.

Fort Assinaboine, Montana, 11th: three parallel arches of light, extending from the eastern to the western horizon, were observed at 9.20 p. m.; the altitudes of the upper and lower arches were 35° and 20°, respectively; they were well defined at the centre, but were indistinct near the horizon; patches of light were also observed in places along the arches.

The following stations also report the display of the 11th: Halifax and Sidney, Nova Scotia; Burlington and Woodstock, Vermont; Cornish, Maine; Cambridge, Massachusetts; Moorestown, New Jersey; Ithaca, New York; Wauseon, Ohio; Swartz Creek, Michigan; Chester and Northfield, Minnesota; Manitowoc and Madison, Wisconsin; Toronto, Ontario; Montreal, Quebec; Winnipeg, Manitoba; Independence, Humboldt, Monticello, and West Union, Iowa.

Smithville, North Carolina, 12th: an aurora consisting of faint glow extending from northeast to west, was observed from 7.30 to 9.30 p. m.

New River Inlet, North Carolina: an aurora was observed at 7 p. m., consisting of a faint yellow light; at 7.40 p. m. the display was obscured by clouds.

Fort Meade, Dakota, 12th: a brilliant aurora was observed from 9 to 11 p. m.

Displays were reported on other dates as follows:

3d.—LeRoy, New York.

7th.—Prairie du Chien, Wisconsin.

10th.—Vermilion, Dakota.

12th.—Bangor, Maine; Independence, Iowa; Winnipeg, Manitoba; Fredericton and Sidney, Nova Scotia.

16th.—Winnipeg, Manitoba; Wellsborough, Pennsylvania; Vevay, Indiana.

17th.—Fredericton, Nova Scotia, and Winnepeg, Manitoba.

21st and 22d.—Winnipeg, Manitoba.

23d.—Richmond, Kentucky.

26th.—Salina, Kansas.

THUNDER-STORMS.

Thunder-storms occurred in the several states and territories as follows:

Alabama.—Mount Vernon and Mobile, 24th; Birmingham, 17th; Greensborough, 4th, 18th; Montgomery, 4th, 8th, 9th, 17th.

Arizona.—Fort Bowie, Fort Grant and Prescott, 22d.

Arkansas.—Lead Hill, 28th.

California.—Fort Gaston and Hydesville, 1st; Princeton, 7th; Sacramento, 6th, 20th; Red Bluff, 6th; Los Angeles, 22d.

Colorado.—Fort Lewis, 20th.

Connecticut.—Southington, 10th.

Dakota.—Webster, 11th.

District of Columbia.—Washington City, 9th.

Florida.—Saint Augustine, 13th; Fort Barrancas and Newport, 24th; Archer, 5th, 14th, 16th, 24th; Limona and Cedar Keys, 14th; Jacksonville, 5th; Key West, 18th; Sanford, 5th, 14th; Pensacola, 8th, 9th, 24th.

Georgia.—Forsyth, 5th, 9th; Milledgeville and Atlanta, 9th; Savannah and Augusta, 5th; Athens, 8th, 9th, 13th.

Illinois.—Springfield, Cairo, Mattoon, Bunker Hill, Sandwich, Wilton Centre, and Charleston, 8th; Anna, 8th, 9th; Swanwick, 9th.

Indiana.—Wabash, Fort Wayne, Guilford, and Indianapolis, 9th; Laconia, Logansport, Vevay, Sunman, and Greencastle, 8th, 9th; Lafayette and Jeffersonville, 8th.

Iowa.—Round Grove, 8th.

Kansas.—Allison, 4th.

Kentucky.—Frankfort and Richmond, 9th; Louisville, 8th, 9th.

Louisiana.—Liberty Hill, 17th; Grand Cotean, 12th, 23d, 24th; New Orleans, 15th, 24th; Shreveport, 8th, 17th.

Maryland.—Fort McHenry and Fallston, 9th.

Missouri.—Saint Louis, 8th.

Nebraska.—Red Willow, 4th.

Nevada.—Carson City, 20th.

New Hampshire.—Mount Washington, 10th.

North Carolina.—Weldon, and Chapel Hill, 4th; Brevard, Statesville, and Lincolnton, 9th; Wilmington, 4th, 5th, 16th; Kitty Hawk and Cape Lookout, 5th; Smithville and Portsmouth, 6th; Fort Macon, 4th, 5th; Hatteras, 4th, 5th, 15th; New River Inlet, 4th, 6th, 16th; Wash Woods, 14th, 16th.

Ohio.—College Hill, 8th, North Lewisburg, Portsmouth, and Columbus, 9th; Cincinnati, 8th, 9th.

Oregon.—Portland, 3d; East Portland, 10th.

Pennsylvania.—Fallsington, 9th.

South Carolina.—Charleston, 5th; Pacolett, 9th; Aiken, 4th, 5th; Stateburg, 4th, 5th, 9th.

Tennessee.—Milan and Chattanooga, 9th; Memphis and Nashville, 8th, 9th.

Texas.—Cleburne and Huntsville, 23d; Galveston, 24th; Palestine, 8th; Indianola, 11th; Rio Grande City, 7th; Brownsville, 20th.

Virginia.—Dale Enterprise, 4th; Norfolk, 16th.

West Virginia.—Helvetia, 9th.

In connection with the thunder-storms of February, the following notes have been reported:

Mr. J. T. Campbell, of Rockville, Indiana, reports the following: "at 7 p. m., on the 6th, I saw the most brilliant flash of lightning I ever observed, even in the summer time; at the time of the flash there was a mist in the air which obscured most of the stars."

Vevay, Switzerland County, Indiana: at 10 p. m., on the 8th, a thunder storm of great violence occurred, each flash of lightning being followed quickly by heavy detonations; another thunder-storm of considerable violence occurred during the morning of the 9th.

Charleston, Coles County, Illinois: a dwelling, eighteen miles north of this place, was struck by lightning and badly damaged during the thunder-storm of the 8th.

Clarksville, Tennessee, 9th: the rain storm during the morning was accompanied by thunder and lightning such as is very unusual in February. Numerous trees in this vicinity were struck by lightning; a stable near by was also struck and burned.

Steelville, Crawford County, Missouri, 14th: an unusual electrical phenomenon occurred at the Palmer lead mines, twenty-five miles southeast of this place, during the night of the 8–9th. A vivid flash of lightning, accompanied by a deafening peal of thunder, struck a large oak tree which was shattered to pieces, the fragments flying in every direction to a distance of three hundred yards; a piece of the tree, weighing three hundred pounds, was hurled through the roof of a barn which stood near; the roots of the tree were also torn out of the ground.

Fort Grant, Arizona, 22d: rain began at 11.10 a. m. being quite heavy at intervals; from 1.25 to 2.15 p. m. it was accompanied by intense sheet lightning and terrific thunder; the lightning arrester in the signal office was damaged.

ELECTRICAL PHENOMENA.

The observer on the summit of Mount Washington, on the 3d, reported the following: "Upon touching the stove, or one person touching another, electric sparks were emitted and perceptible shocks felt."

Fort Benton, Montana, 16th: for about four hours during the afternoon telegraphic communication was interrupted by atmospheric electricity.

Fort Assinaboine, Montana, 16th: from 3.35 to 4.20 p. m., telegraphic communication was suspended on account of atmospheric electricity.

Fort Maginnis, Montana, 16th: during the prevalence of a high westerly wind from 12.40 to 9.30 p. m., all metallic objects, when touched, emitted electric sparks. A match was ignited by being placed between the contact points of a telegraph key.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arizona.—9th, 12th.

Arkansas.—4th, 7th, 12th, 14th, 17th, 18th.

California.—1st, 4th, 5th, 6th, 8th, 11th, 13th, 17th, 18th, 19th, 25th, 26th.

Colorado.—13th, 21st.

Connecticut.—24th.

Dakota.—7th, 9th, 11th, 12th, 14th.

Florida.—8th, 16th, 20th, 27th.

Illinois.—10th, 11th, 14th, 16th, 19th, 28th.

Indiana.—5th, 11th, 12th, 13th, 18th, 20th.

Iowa.—8th to 11th, 14th to 23d, 26th.

Kansas.—12th, 13th, 14th, 18th, 20th, 28th.

Kentucky.—23d.

Louisiana.—7th.

Maine.—9th.

Michigan.—5th, 8th to 11th, 19th, 28th.

Minnesota.—4th, 9th to 13th, 15th, 16th, 18th, 19th.

Nebraska.—9th, 10th, 12th, 18th, 19th, 27th, 28th.

Nevada.—20th.

New Hampshire.—9th.

New York.—3d, 7th, 18th, 21st to 25th.

North Carolina.—5th, 8th, 12th, 15th, 19th.

Ohio.—1st, 3d, 10th to 23d, 25th, 27th, 28th.

Oregon.—24th.

Pennsylvania.—8th, 16th, 21st, 28th.

South Carolina.—21st, 25th.

Texas.—1st, 7th, 26th, 27th.

Virginia.—4th, 5th, 8th, 12th, 19th, 23d.

Wisconsin.—10th, 11th, 13th, 17th, 28th.

Wyoming.—16th, 20th, 21st, 27th.

Observers at La Crosse, Wisconsin, and Chester, Minnesota, report having observed on the 11th solar halos, mock suns, &c., of unusual appearance.

LUNAR HALOS.

Lunar halos were observed in the various states and territories as follows:

Alabama.—20th.

Arizona.—19th, 20th, 21st, 28th.

Arkansas.—20th.

California.—19th, 21st, 23d to 27th.

Colorado.—21st, 27th.

Connecticut.—24th.

Dakota.—22d, 24th, 26th, 27th.

Delaware.—27th.

Florida.—1st, 20th, 21st, 23d, 24th, 28th.

Georgia.—25th.

Illinois.—23d, 28th.

Indiana.—23d, 26th, 27th, 28th.

Iowa.—19th, 24th, 26th, 28th.

Kansas.—4th, 18th, 22d, 27th, 28th.

Kentucky.—23d, 28th.

Louisiana.—5th, 20th.

Maryland.—28th.

Massachusetts.—19th, 20th, 22d, 24th, 26th, 27th, 28th.

Michigan.—1st, 10th, 22d, 27th.

Montana.—2d, 17th.

Nebraska.—27th, 28th.

Nevada.—23d.

New Hampshire.—24th, 28th.

New York.—1st, 21st, 22d, 24th, 25th, 27th, 28th.

North Carolina.—5th, 23d, 25th, 26th.

Ohio.—2d, 18th, 19th, 20th, 22d, 23d, 25th, 28th.

Oregon.—21st, 26th, 27th, 28th.
Pennsylvania.—3d, 12th, 14th, 19th, 25th, 28th.
Rhode Island.—24th.
South Carolina.—11th, 16th, 17th, 21st, 25th.
Tennessee.—18th.
Texas.—19th, 21st, 24th to 27th.
Vermont.—24th.
Virginia.—4th, 19th, 25th, 26th, 28th.
Washington Territory.—20th, 22d, 25th, 27th, 28th.
Wisconsin.—23d, 27th.
Wyoming.— d, 20th, 22d, 27th.

The phases of the moon during February were: last quarter, 6th, 5.31 p. m.; new moon, 14th, 9.15 p. m.; first quarter, 22d, 5.25 a. m.; full moon, 28th, 10.54 p. m.; apogee, 9th, 7.24 p. m.; perigee, 25th, 6.24 p. m.

MIRAGE.

Fort Grant, Arizona: a mirage was observed at 10.30 a. m. of the 4th, showing the reflection of a lake fourteen miles west of station. On the 14th, at 9.30 a. m., a mirage was observed in the south, representing the forms of mountains inverted. Mirage was also seen on the 16th in the southeast, showing the reflection of a lake.

Mirage was observed at other stations as follows:
Webster, Dakota, 14th.
Vermilion, Dakota, 11th, 12th, 18th, 21st, 25th, 26th.
Salina, Kansas, 15th, 16th.
Northport, Michigan, 23d.
Marquette, Michigan, 24th.
Marquette, Nebraska, 26th.
Genoa, Nebraska, 26th, 27th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-three stations show 4,523 observations to have been made, of which three were reported doubtful; of the remainder, 4,520, there were 3,940, or 87.2 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for February, 1885:

Date—Feb., 1885.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
2, 3 p. m...	0	0	0	0	0	0	5	25‡	
5, 10 a. m..	.....	..	.....	.....	.....	.....	5	70‡	Most of the spots small.
6, 10 a. m...	0	0	0	5‡	0	0	5	60‡	Do.
7, 4 p. m...	2	10‡	2	3	0	0	5	60‡	Do.
10, 5 p. m..	2	15‡	.....	.....	.....	.....	4	45‡	
11, 10 a. m....	1	2	1	5‡	1	2	5	45‡	
13, 10 a. m....	0	0	.....	.....	0	0	5	45‡	
15, 12 m.	1	25‡	0	0	1	5	6	70‡	
17, 1 p. m..	0	0	0	0	0	0	6	70‡	
18, 5 p. m...	1	5	0	0	1	5	7	75‡	
20, 1 p. m....	2	15‡	0	10‡	2	15‡	9	75‡	
21, 5 p. m....	1	5‡	1	15‡	0	0	9	60‡	
23, 4 p. m....	1	2	.....	.....	1	2	5	35‡	
24, 3 p. m....	1	1	1	2	1	1	5	30‡	
25, 5 p. m....	1	1	0	0	1	1	5	20‡	
28, 3 p. m....	2	55‡	.....	.....	.....	.....	3	65‡	Most of the spots small.

Faculæ were seen at the time of every observation. ‡Approximated.

EARTHQUAKES.

Professor C. G. Rockwood, jr., of Princeton, New Jersey, has forwarded the following report:

February 2, at 7.10 a. m., a light earthquake was felt at Wytheville, Wythe county, Virginia, with a sound like the rumbling of distant thunder, which seemed to come from the northwest. Apparently it was confined to the immediate vicinity of Wytheville. Inquiries by letter to adjoining counties brought replies from Marion, Smythe county, on the southwest; Rural Retreat, Wythe county, and Independence, Grayson county, on the south; Hillsville, Carroll county, on the southeast; Pulaski station, Pulaski county, on the northeast; and Bland Court House, Bland county, on the north, at none of which places was it felt.

The "Charleston News and Courier" of February 14th, 1885, contains the following:

CITY OF MEXICO, via GALVESTON, *February* 12th.—At Tequi Sixtlan (?) in the state of Oaxaca, a sharp earthquake was experienced last Sunday (8th). It lasted two seconds. Another more violent shock was felt at Niltepec, also in the state of Oaxaca, several buildings swaying and one house falling.

The following are extracts from "Nature" of February 19th and 26th:

Shocks of earthquake continue to be felt in the south of Spain. A telegram from Granada on the 12th, stated that slight shocks continued to be felt at Alhama, and on that day there was a shock at Terre del Campo, near Jaen. There were also shocks in the evening of the 14th, at Granada and Velez Malaga.

The last earthquakes in southern Spain (February 15th) were incident with slight subterranean motions in Algiers and in Savoy. The valley of Isère and Chamberg principally felt them.

METEORS.

San Diego, California, 4th: a meteor of great brilliancy, from which there was a continuous flow of sparks, was observed at 7.30 p. m. Its direction was from a point near the zenith northeastward through a path 20° in length.

Wickenburg, Arizona, 18th: a meteor was observed at 12.21 a. m.; it was apparently from six to seven inches in diameter and moved toward the northwestern horizon, the duration of its flight being from five to eight seconds. The light from the meteor was sufficiently bright to enable a person to read fine print by it. Just before its disappearance it exploded into two parts of about equal size, and for two or three minutes after the explosion a loud report was heard, resembling the sound of a distant cannon. During the passage of the meteor it threw off brilliant sparks and at its disappearance left a cloud which soon faded away.

Prescott, Arizona, 18th: a brilliant meteor passed across the sky from southeast to northwest at 12.15 a. m.

The following is from the "Washington Post" of February 24, 1885:

VICTORIA, B. C., *February* 23.—A meteor passed over this city this morning about 9 o'clock. It was of enormous size and appeared like a mass of molten iron. The noise caused by its passage was like that of escaping steam. Smoke and flames were thrown off by the meteor. It was seen to descend into the sea, a cloud of spray and steam marking the spot.

The following is from the "New York Maritime Register" of March 18, 1885:

The bark "Innerwick" (Br.) from Yokohama, at Victoria, B. C., March 2, reported that at midnight of February 24, in N. 37°, E. 70° 50′,? (probably W. 127°) the wind was blowing heavily from sse.; at 5 a. m. the sky changed to a fiery red, and all at once a large mass of fire appeared over the vessel and fell into the sea some fifty yards to leeward, with a hissing sound, causing the bark to quiver from stem to stern. A towering mass of white foam was then seen rapidly approaching the vessel. The bark was struck flat aback, and before there was time to touch a brace the sails filled again, and the roaring white sea could be seen passing away ahead. Another sheet of flame then ran down the mizzenmast, from the rigging of which poured myriads of sparks, and for twenty minutes the strange redness of the sky remained.

Lead Hill, Boone county, Arkansas: at 6.15 p. m., on the 27th, a bright meteor was observed.

Nashville, Tennessee, 27th: a very bright meteor was observed at 6.58 p. m.; it passed from a point 40° above the northern horizon in a southwesterly course and disappeared beneath the western horizon; it left a track of yellowish color which remained visible forty-five seconds.

Chattanooga, Tennessee, 27th: a brilliant meteor is reported to have passed over this place in a direction from east to west shortly before 7 p. m. on the 27th.

The following is an extract from the February, 1885, report of the Tennessee Weather Service:

Meteors were observed on the 19th at Quarter and on the 27th at Sunbright, Grief, Riddleton, Florence Station, Nashville, Ashwood, Kingston Springs, Hohenwald, McKenzie and Milan. The meteor of the 27th was one of the most brilliant and remarkable that has appeared in this part of the country for many years. Of this phenomenon the following notes were made: The observer at Sunbright reports, a large, very brilliant meteor appeared in the zenith at 7 p. m, traveling westward with a train of about 18° to 20° in length, and disappeared below the horizon. The body was yellowish in color. The observer at Grief reports a very bright meteor at 7 p. m., moving from east to west, seemingly as large as the moon. It disappeared

a little above the horizon in the west. The observer at Riddleton reports, at 6.50 p. m. a large meteor in sw. 60° from horizon, direction wnw., throwing off particles like a rocket before passing out of sight behind the horizon. The observer at Florence Station reports, at 6.54 p. m. a very large and exceedingly bright meteor observed se. to sw., starting se. altitude 35°, course se. to nw., disappearing due west of station; time of flight observed 3 minutes and 10 seconds. The observer at Ashwood reports, at 7 p. m. a very beautiful meteor in the north, lighting up the heavens brighter than the moon; it exploded with a loud report. A little girl who saw it ran in and exclaimed "the moon's busted!" The observer at Kingston Springs reports, a meteor was observed at 7 p. m. in ne.; seemed to be as large as a man's head, moving sw., after being visible ten seconds, it exploded, scattering fire in all directions. The observer at Hohenwald reports, at 6.30 p. m a very brilliant meteor, first observed a little below the moon (which was about an hour and a half above the horizon), it passed directly overhead, moving west and disappeared about where the sun sets; about two minutes after it passed it exploded with a report like a cannon at a distance, followed by rumbling noises for about a minute. This meteor was very brilliant, as trees and buildings cast dark shadows, which traveled around them from west to east as it progressed westward. Although the full moon was shining brightly, the light attracted attention in the houses where lamps were burning, parties saying was similar to the light thrown in through the windows by a person passing with a lighted lantern. The observer at McKenzie reports, a meteor at 6.35 p. m., se., direction sw., 45° above the horizon. The observer at Milan reports about 8 p. m., a large brilliant meteor about the size of an infant's head, appeared in the eastern sky 30° from the horizon, going in a southerly direction; when near the horizon it disappeared as if it had exploded; no noise was heard.

Meteors were also reported from the following stations:
Le Roy, New York, 1st, 14th.
New River Inlet, North Carolina, 2d.
Liberty Hill, Louisiana, 8th.
Cedar Rapids, Iowa, 12th.
Wausau, Wisconsin, 22d.
Archer, Florida, 27th, at 1 a. m., very bright.
Allison, Kansas, 27th, at 10.40 p. m., in the southern sky, passing northeastward.

WATER-SPOUTS.

The "New York Maritime Register" of March 11, 1885, contains the following:

Captain Simmons, of the British brig "Charley," at Point á Pitre, February 17th, reports that on the 6th, in latitude N. 37° 30′, and longitude W. 72° and 71°, passed near a water-spout, the water flying hundreds of feet into the air and going around at a fearful rate; the water-spout covered a space of five hundred or more square feet.

Sandy Hook, New Jersey: at 9.45 a. m. on the 10th a water-spout was observed in the direction of the Scotland light-ship, about four miles distant; it was clearly defined and lasted about one minute.

The s. s. "British Princess," F. H. Freeth, commanding, reports that on February 21st, in latitude N. 39°, longitude W. 62°, several well-defined, and many imperfectly formed water-spouts were observed between noon and 8 p. m., Greenwich mean time.

The British bark "Artizan," J. Dwyer, master, reports having observed on February 22d, two large water-spouts in latitude N. 39° 10′, longitude W. 60° 10′.

POLAR BANDS.

Montrose, Colorado, 16th.
Archer, Florida, 4th, 7th, 10th, 23d.
Anna, Illinois, 21st.
Yates Centre, Kansas, 18th, 27th.
Mountainville, New York, 1st.
Memphis, Tennessee, 20th.
El Paso, Texas, 4th, 19th, 28th.
Rio Grande City, Texas, 4th, 5th, 6th, 24th, 26th.
Wytheville, Virginia, 6th, 7th.
Fort Bridger, Wyoming, 26th.

MIGRATION OF BIRDS.

Geese flying southward.—Cœur d'Alene, Idaho, 17th; Austin, Tennessee, 2d.

Geese flying northward.—Fort Smith, Arkansas, 27th; Sacramento, California, 14th, 25th; Red Bluff, California, 5th; Yates Centre, Kansas, 28th; Independence, Missouri, 28th; El Paso, Texas, 1st; Brownsville, Texas, 27th.

Ducks flying southward.—Memphis, Tennessee, 10th.
Ducks flying northward.—Indianola, Texas, 1st.
Brants flying northward.—Indianola, Texas, 26th.

DROUGHT.

Los Angeles, California, 28th: with the exception of a light sprinkle on the 23d, no rain fell at this place during the month, and much anxiety concerning the crops is felt by the farmers in this part of the state.

SAND STORM.

West Las Animas, Colorado: a violent sand storm prevailed from 6.45 to 7.30 p. m., the wind blowing at the rate of forty-six miles per hour from the north.

Wickenburg, Arizona, 12th, 28th.

PRAIRIE FIRES.

Dodge City, Kansas, 18th.

Fort Stockton, Texas: prairie fires were observed east of station on the 4th, and in the northeast on the 11th.

ERRATUM.

On page 15 of the January REVIEW, under "local storms and tornadoes," the tornado reported as having occurred at Haddock's Station, Georgia, at noon of the 12th, should read: midnight of the 11–12th.

NOTES AND EXTRACTS.

The following is an extract from the February, 1885, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., Auburn:

The month of February has been decidedly colder than the same period of time in a number of years. The average temperature was about 6° below the normal. In north Alabama and in most of the middle portions of the State but little farm work has been accomplished because of the frozen condition of the ground on so many days of the month. The fall oats were all killed, and the farmers were compelled to replough the fields and sow them in spring grains. The wheat generally looks badly. In south Alabama the truck gardens suffered severely, the early cabbage crops being almost entirely destroyed. Two cold waves crossed the state on the 11th and 17th. During the passage of the first the temperature fell from 50° to 65° in twenty to thirty hours. This was the greatest reduction for the time recorded during the winter.

The average rainfall for the month was below the normal. There was a general snowfall on the 12th, and the depth of snow has been added to the amount of rain by considering ten inches of snow equal to one inch of rain. This is the rule adopted by the Chief Signal Officer. There were nine rainless days.

The average temperature for the winter just closed, 44°.4, is 5° below the normal. December 19th, January, 22d, and February 11th were the coldest days of the winter. The average precipitation, 17.99 inches, is about 5 inches above the normal.

Mean depth of rainfall, 3.58 inches; mean daily rainfall, 0.128; greatest depth of monthly rainfall, 6.25 inches at Newton; least depth of monthly rainfall, 2.23 inches at Brundidge; greatest daily rainfall, average for the state, 0.97 of an inch on the 24th; greatest local daily rainfall, 3.00 inches at Tuscaloosa on the 12th.

It is just twelve months since the organization of the State Weather Service. In reviewing the work accomplished the director compliments the observers upon the large amount of valuable data they have collected by earnest and careful investigation. In some respects the year has yielded to the watchful observers material that has been highly prized by students of meteorology in other sections. The bulletins of the service have been in demand, and many have been circulated outside of the state among the scientists of the country. It is to be regretted that so few of the stations were able to present a continuous record during the year; but at the end of another annual period the director trusts that the list of complete records will be very largely increased.

The railway signal service has become an established fact, and the amount of good that has accrued to the people of the state wherever the flags have been raised cannot be calculated. Expressions of indorsement and hearty approval have been sent to the director from all sections, and many stations where signals are not displayed have sent urgent requests to have the same favors extended to them.

State summary.

Mean temperature, 42°.6; highest temperature, 80° at Mount Willing on the 9th; lowest temperature, 1° at Gadsden on the 11th; range of temperature, 79°; greatest monthly range of temperature, 69° at Gadsden; least monthly range of temperature, 49° at Mobile; mean daily range, 13°; greatest daily range of temperature, 49° at Tuscaloosa on the 9th; least daily range of temperature, 0° at Clintonville on the 13th and Fayette on the 8th.

Days of general rainfall, 8th, 9th, 15th, 24th; average number of days on which rain fell, 8; average number of cloudy days, 10; average number of

Meteorological record of voluntary observers and army post surgeons—February, 1885.

Station.	Temperature Mean.	Maximum.	Minimum.	Rainfall.
Fort Preble, Me	17.7	39	—16	3.11
Orono, Me	13.3	41	—17	4.45
Cornish, Me		41	—14	4.50
Gardiner, Me	14.8	44	—13	6.44
Contoocook, N. H	13.5	43	—10	3.80
Lake Village, N. H				4.37
Wiers Bridge, N. H				3.03
Bristol, N. H				3.54
Ashland, N. H				2.91
Woodstock, N. H				3.20
Belmont, N. H				4.09
Wolfborough, N. H				5.63
Charlotte, Vt	9.0	40	—20	2.70
Burlington, Vt	12.2	38	—18	1.40
Woodstock, Vt	6.7	41	4 —38	2.85
Dorset, Vt	11.5	36	—15	3.37
Lunenburg, Vt	8.8	34	—26	2.35
Newport, Vt	7.5	40	—10	3.34
Strafford, Vt	11.0	40	—16	2.00
Amherst, Mass	16.9	41	— 8	3.38
Williamstown, Mass	13.7	38	—10	3.56
Dudley, Mass				4.15
Mendon, Mass	16.6	42	— 4	
Milton, Mass	19.3	46	— 3	2.46
New Bedford, Mass	20.4	44	0.5	3.21
Fall River, Mass		51	2	2.80
Somerset, Mass	19.6	52	— 5	2.77
Princeton, Mass	13.8	36	—11	2.94
Westborough, Mass	20.8	53	— 2	4.34
Leicester, Mass	14.2	43	—10	3.38
Taunton, Mass	21.4	52	1	2.93
Rowe, Mass	11.2	39	—12	3.91
Readville, Mass	16.5	49	— 3	1.18
Worcester, Mass	16.0	39	— 3	3.49
Providence, R. I	22.0	52	1	3.18
Sayatt Point, R. I		38	3	5.10
Hartford, Conn	18.0	45	— 2	3.48
Southington, Conn	17.5	43	— 3	4.08
North Colebrook, Conn	14.5	46	—11	2.13
Bethel, Conn				3.61
Voluntown, Conn		44	— 2	3.30
Fort Hamilton, N. Y	22.9	48	— 2	4.34
Mountainville, N. Y	18.9	46	— 7	3.56
Palermo, N. Y	9.8	36	—11	2.55
Auburn, N. Y	16.2	42	— 8	3.56
Humphrey, N. Y	14.1	46	—24	1.57
Menand, N. Y	13.8	40	—10	2.04
Ithaca, N. Y	15.3	44	—13	1.59
Le Roy, N. Y	15.1	47	—12	1.49
Penn Yan, N. Y				1.61
Cooperstown, N. Y	10.5	38	—12	2.46
North Volney, N. Y	12.4	39	— 7	2.20
Port Jervis, N. Y	14.3	39	—12	1.62
Factoryville, N. Y	14.8	42	—18	1.37
White Plains, N. Y	22.5	42	— 1	5.55
Fort Niagara, N. Y	13.5	40	—12	1.22
Fort Columbus, N. Y	23.1	44	0	5.71
Madison Barracks, N. Y	10.6	40	—21	1.42
Plattsburg Barracks, N.Y.	7.2	35	—27	1.33
David's Island, N. Y	23.5	52	— 3	3.60
Phillipsburg, N. J	21.9	40	— 1	4.00
Somerville, N. J	21.6	44	— 2	4.47
Readington, N. J	26.8	48	— 2	
Vineland, N. J	25.9	54	1	3.79
Moorestown, N. J	21.6	42	— 2	4.23
South Orange, N. J	22.8	44	— 2	4.78
Salem, N. J	26.9	48	5	
Wellsborough, Pa	16.7	44	—22	1.46
Fallsington, Pa	21.1	40	— 1	4.91
Leetsdale, Pa	20.6	50	—10	2.59
Grampian Hills, Pa	13.7	42	—16	2.23
Troy, Pa	14.3	42	—18	1.98
Dyberry, Pa	13.0	37	—15	2.75
Blooming Grove, Pa		48	—10	
Catawissa, Pa	18.8	48	—11	3.13
Westchester, Pa	21.5	52	— 3	0.39
Easton, Pa	25.7	50	0	
Quakertown, Pa	19.8	45	— 4	4.38
Altoona, Pa	25.7	50	— 1	1.59
Chambersburg, Pa	20.0	46	— 4	3.47
Franklin, Pa	14.0	42	—18	2.08
Haverford College, Pa		42	— 2	5.80
Cumberland, Md	26.0	50	— 6	2.52
McDonogh, Md		46	— 3	3.62
Emmitsburg, Md	23.7	49	— 1	3.74
Woodstock, Md	24.5	48	— 3	3.81
Fallston, Md	23.8	49	0	4.59
Great Falls, Md	27.0	50	4	4.15
Fort McHenry, Md	24.6	45	1	3.75
Dale Enterprise, Va	23.9	58	—10	2.94
Wytheville, Va	29.8	65	— 4	1.94
Variety Mills, Va	29.6	61	2	3.61
Blacksburg, Va		59	— 6	
Fort Monroe, Va	35.3	62	10	2.34
Snowville, Va		55	— 2	
Marion, Va	28.0	56	— 8	2.36
Summit, Va	28.8	62	— 2	
Bird's Nest, Va	35.0	67	11	3.40
Lenoir, N. C				3.30
Brevard, N. C	36.1	64	20	5.38
Lincolnton, N. C	33.3	54	8	4.68
Statesville, N. C	30.6	62	8	4.87
Weldon, N. C	34.2	62	10	2.42
Chapel Hill, N. C	36.0	68	9	2.73
Stateburg, S. C	40.0	64	16	3.37
Aiken, S. C	45.8	67	13	3.97
Pacolet, S. C	35.8	61	9	
Milledgeville, Ga	42.4	71	13	3.39
Athens, Ga	39.1	66	7	4.86
Forsyth, Ga	44.4	73	14	2.92
Quitman, Ga		67	31	5.50
Archer, Fla	57.1	79	32	6.90
Mayport, Fla	56.3	76	38	4.48
Limona, Fla	59.8	85	38	4.45
Fort Barrancas, Fla	52.6	75	23	5.35
Saint Augustine, Fla	55.0	77	34	4.35
Green Springs, Ala	43.4	69	13	2.72
Mt. Vernon B'ks, Ala	49.8	81	15	3.52
Greensboro, Ala	44.9	70	16	3.33
Birmingham, Ala	41.3	74	10	
Point Pleasant, La	45.0	69	20	4.72
Liberty Hill, La		74	15	
Luling, La		78	20	2.04
Grand Coteau, La	52.4	73	25	1.62
Cleburne, Tex	39.1	72	8	1.01
Fort Brown, Tex	58.6	84	36	1.34
Comfort, Tex				0.12
Huntsville, Tex		80	18	3.01
Fort Concho, Tex	45.7	79	15	2.15?
Austin, Tex	48.9	77	24	
Lead Hill, Ark	32.2	78	— 4	1.47
Wellsburg, W. Va				2.50
Helvetia, W. Va	25.7	52	—22	2.65
Milan, Tenn	33.8	72	5	2.57
Austin, Tenn	33.0	69	3	2.06
Ashwood, Tenn	35.5	68	3	2.40
Greenville, Tenn	32.0	62	1	2.80
Maryville, Tenn	36.0	68	5	2.99
Andersonville, Tenn	33.6	64	0	3.78
Careyville, Tenn	33.0	63	0	3.20
Parksville, Tenn	37.0	70	6	2.93
Sunbright, Tenn	32.0	68	— 4	3.53
Grief, Tenn	34.0	68	2	3.85
Farmingdale, Tenn				2.66
Fostoria, Tenn	33.0	65	0.2	2.10
Grassy Cove, Tenn	31.0	64	1	1.70
Cookville, Tex	31.0	69	— 1	2.54
Manchester, Tenn	32.0	67	0	2.19
Riddleton, Tenn	32.0	68	0.5	4.37
Beech Grove, Tenn	34.0	70	3	2.05
Flat Creek, Tenn	35.0	68	1	2.63
Florence Station, Tenn	34.0	68	6	2.39
Howell, Tenn	36.0	72	6	2.09
Barren Plains, Tenn	32.0	64	2	1.10
Hurricane Switch, Tenn	34.0	65	3	2.45
Dickson, Tenn	31.0	68	2	1.54
Sailors Rest, Tenn	32.0	59	1	2.07
Hohenwald, Tenn	34.0	70	— 2	2.52
Savannah, Tenn	36.0	68	7	2.35
McKenzie, Tenn	34.0	69	4	2.55
Henderson, Tenn	35.0	69	6	2.29
Dresden, Tenn				1.12
Trenton, Tenn	33.0	67	5	1.96
Bolivar, Tenn	30.0	70	5	1.53
Dyersburg, Tenn	33.0	68	3	1.55
Somerville, Tenn	36.0	70	8	1.81
Covington, Tenn	34.0	65	9	1.66
Richmond, Ky	26.9	62	— 6	2.21
Frankfort, Ky	26.9	63	— 6	2.91
Ruggles, Ohio	16.5	46	—15	0.80
Quaker City, Ohio	22.3	47	—18	2.23
Hiram, Ohio	15.2	48	—19	1.70
Canton, Ohio	17.1	46	—14	1.90
Jacksonborough, Ohio	15.4	52	—17	2.95
Westerville, Ohio	18.6	52	—18	1.88
North Lewisburg, Ohio	19.5	53	—17	1.80
Warren, Ohio	17.1	44	—15	1.54
College Hill, Ohio	25.4	52	—15	1.80
Wooster, Ohio	18.5	48	—15	1.62
Tiffin, Ohio	11.6	47	—18	1.03
Wauseon, Ohio	11.9	51	—24	1.15
Portsmouth, Ohio	26.1	68	— 6	2.41
Garrettsville, Ohio	16.7	48	—18	1.53
Oberlin, Ohio	16.2	45	—19	0.61
Dayton, Ohio	19.7	50	—15	2.41
Sidney, Ohio	16.1	49	—16	1.65
Junction, Ohio	14.0	54	—27	0.64
Levering, Ohio	15.4	50	—16	1.14
Gambier, Ohio	18.8	47	—14	1.52
Ironton, Ohio	27.7	66	—13	2.09
Washington C. H., Ohio	21.2	54	—13	2.38
Waverly, Ohio	22.4	57	—16	2.43
Logan, Ohio	22.4	56	—14	1.71
Marietta, Ohio	24.6	59	—11	2.39
McConnelsville, Ohio	19.7	51	—15	2.33
Pomeroy, Ohio	26.1	58	— 6	3.34
Granville, Ohio	18.6	50	—12	2.80
Lafayette, Ind	14.7	50	—26	2.02
Fort Wayne, Ind	19.0	55	—15	
Logansport, Ind	18.1	53	—24	4.10
Laconia, Ind	25.7	65	— 6	2.24
Terre Haute, Ind		51	—10	1.00
Sunman, Ind	22.0	58	—14	2.85
Jeffersonville, Ind	24.4	63	— 5	2.41
Spiceland, Ind	17.6	52	—14	1.53
Guilford, Ind	22.1	56	—14	2.70
Vevay, Ind	25.1	59	— 9	2.46
Wabash, Ind	15.6	60	—15	1.26
La Grange, Ind	11.8	46	—21	1.43
Monticello, Ind	14.4	45	—25	1.87
Attica, Ind	12.7	50	—24	
Angola, Ind	11.7	52	—25	1.23
Connersville, Ind	18.7	53	—17	2.43
Noblesville, Ind	21.0	48	—14	0.41
Miami, Ind	12.9	54	—28	
Greenfield, Ind	17.0	45	—16	
Franklin, Ind	18.9	60	—16	0.53
Crawfordsville, Ind	18.7	60	—18	
Farmland, Ind	16.4	52	—16	1.33
Huntington, Ind	11.8	50	—23	
Mauzy, Ind		43	—20	1.99
Fillmore, Ind	15.7	50	—16	1.43
Romney, Ind	14.6	52	—18	1.77
Dana, Ind	15 6	52	—20	4.55
Richmond, Ind	17.1	50	—22	1.75
Columbus, Ind	20.5	60	—14	0.88
Blue Lick, Ind	24.6	62	—10	2.46
Marengo, Ind	29.7	69	— 2	4.30
Huntingburg, Ind	25.1	62	— 6	2.04
Princeton, Ind	23.5	62	— 8	0.80
Worthington, Ind	20.3	64	—15	2.67
Degonia Springs, Ind	26.1	68	— 6	2.16
Salem, Ind	23.6	63	—10	1.45
Corydon, Ind	24.3	63	— 6	2.88
Tipton, Ind	15.7	50	—18	
Mattoon, Ill	18.3	53	—14	0.65
Collinsville, Ill	22.8	63	—11	0.76
Sycamore, Ill	8.7	42	—27	1.55
Sandwick, Ill	9.1	46	—34	1.25
Wilton Centre, Ill	10.6	46	—32	2.76
Peoria, Ill	15.9	49	—22	0.87
Charleston, Ill	16.0	60	0	0.96
Anna, Ill	28.0	69	— 6	1.22
Bunker Hill, Ill	20.3	60	—13	0.87
South Evanston, Ill		44	—24	2.55
Rockford, Ill	7 6	42	—25	2.50
Riley, Ill	7.7	40	—24	1.92
Swanwick, Ill	22.3	67	—10	0.66
Hudson, Mich	16.1	49	—36	1.09
Harrisville, Mich		45	—26	1.66
Moorestown, Mich	5.6	47	—32	1.54
Manistique, Mich	6.9	42	—28	2.16
Ann Arbor, Mich	10.8	46	—23	1.40
Ionia, Mich	10.5	45	—20	2.19
Northport, Mich		40	—22	0.41
Traverse City, Mich		44	—25	1.78
Kalamazoo, Mich		44	—25	2.84
Thornville, Mich	10.6	35	—22	1.53
Fort Brady, Mich	4.4	41	—39	0.64
Swartz Creek, Mich	8.2	42	—27	1.41
Lansing, Mich	10.5	45	—22	0.45
Mottville, Mich		50	—33	3.01
Embarras, Wis	6.6	46	—35	0.80
Manitowoc, Wis	11.0	43	—24	0.71
Sussex, Wis	7.5	39	—24	1.17
Beloit, Wis	8.6	42	—24	1.21
Neillsville, Wis	1.6	36	—37	0.13
Wausau, Wis	5.8	44	—29	0.21
Madison, Wis	8.2	40	—22	0.82
Prairie du Chien, Wis	9.0	41	—22	1.00
Minneapolis, Minn	6.0	44	—30	0.33
Northfield, Minn	6.5	40	—31	0.29
Fort Snelling, Minn	4.6	42	—31	0 15
Chester, Minn		39	—30	
Monticello, Iowa	8.7	45	—26	0.72
Cresco, Iowa	4.1	37	—32	0.43
Des Moines (near) Iowa	12.2	54	—24	1.30
Humboldt, Iowa	4.2	38	—31	1.04
Round Grove, Iowa		44	—26	
Independence, Iowa	9.1	39	—23	0.86
Ottumwa, Iowa	15.8	48	—23	1.90
Manchester, Iowa	10.5	42	—25	0.54
Logan, Iowa	15.5	52	—22	1.10
Oskaloosa, Iowa		46	—20	1.48
Cedar Rapids, Iowa	10.1	44	—24	0.08
Fort Madison, Iowa		48	—20	
Guttenberg, Iowa	7.0	46	—30	0.58
Muscatine, Iowa	10.4	44	—30	2.21
West Union, Iowa	6.8	40	—28	0.93
Maynard, Iowa	14.1	36	—29	
Mount Vernon, Iowa		46	—28	
De Soto, Nebr	14.5	49	—19	0.73
Red Willow, Nebr	25.0	56	—23	1.74
Fremont, Nebr	12.2	50	—24	3.92
Genoa, Nebr	14.1	52	—24	0.57
Tecumseh, Nebr	19.7	60	—24	1.35
Crete, Nebr	15.2	57	—21	0.48
Fort Robinson, Nebr	22.6	55	—24	1.12
Syracuse, Nebr	17.6			2.90
Weeping Water, Nebr	18.9			
Central City, Nebr	14.1			1.00
DeWitt, Nebr	18.7			1.40
Nebraska City, Nebr	14.9			0.35
Stromsburg, Nebr	17.0			0.53
Madison, Nebr	13.1	48	—22	1.15
Table Rock, Nebr	10.7			0.80
West Hill, Nebr	13.0			0.45
Superior, Nebr	18.9			
Booneville, Mo	10.5	52	—17	0.66
Caryville, Mo		49	—21	1.12
Greenfield, Mo	27.0	64	—12	0.60
Independence, Mo	19.0	54	—20	0.75
Springfield, Mo	27.4	64	—13	1.05
Pierce City, Mo	25.7	63	— 8	0.90
Centreville, Mo		68	—12	0.88
Conception, Mo	15.4	47	—23	
Chamois, Mo	27.5	59	—12	0.75
Carthage, Mo	31.3	62	— 8	
Glasgow, Mo	19.1	50	—16	0.94
Warrenton, Mo	23.7	58	—10	
Harrisonville, Mo				
Ironton, Mo	27.4	67	—10	0.65
Mascoutah, Ill	24.7	60	— 9	1.28
Kirksville, Mo	16.9	50	—22	0.70
Lexington, Mo	16.9	50	—19	1.39
Louisiana, Mo	17.9	52	—17	1.00
Mexico, Mo		50	—19	0.66
Miami, Mo	19.0	50	—20	1.28
Oregon, Mo	17.2	54	—22	1.57
Sedalia, Mo	20.7	50	—20	1.04
Steelville, Mo		64	— 6	1.20
Sherrill, Mo	27.4	64	—11	0.65
Saint Charles, Mo			—14	0.80
Atchison, Kans	18.7	53	—18	0.91
Manhattan, Kans		56	—18	0.50
Fort Scott, Kans	26.5	56	—11	1.50
Wyandotte, Kans	19.2	52	—14	0.83
Sterling, Kans	23.4	62	—12	0.93
Salina, Kans	22.0	45	— 6	0.07
Yates Centre, Kans	21.1	55	—10	0.55
Emporia, Kans	22.9	61	—14	0.46
Clay Centre, Kans	22.1	61	—21	1.19
Maud, Kans	25.7	64	— 9	0.38
Wellington, Kans	24.6	54	— 6	0.57
Allison, Kans	22.5	70	—20	1.14
Lawrence, Kans	20.8	55	—14	1.12
Sherlock, Kans	26.2	60	0.5	0.84
Holton, Kans	18.8	54	—22	2.00
Fort Yates, Dak	4.1	49	—32	0.34
Fort Buford, Dak	3.0	44	—32	0.26
Fort Totten, Dak	—3.3	37	—35	0.19
Fort Meade, Dak	12.2	65	—19	0.23
Fort Sisseton, Dak	1.4	41	—36	0.15
Fort Sully, Dak	10.6	57	—25	0 15
Fort Randall, Dak	15.5	50	—25	0.42
Fort Pembina, Dak		40	—34	0.20
Fort A. Lincoln, Dak	—0.9	42	—35	0.80
Webster, Dak	6.8	62	—38	trace
Vermilion, Dak		69	—24	0.22
Pueblo, Colo	31.2	64	— 3	0.60
Fort Lewis, Colo	26.7	54	0	0.44
Fort Lyon, Colo	29.3	68	— 5	
Fort Keogh, Mont	17.3	50	—28	trace
Fort Ellis, Mont	24.2	55	—20	1.40
Fort Shaw, Mont	24.2	56	—19	0.78
Fort Assinaboine, Mont	16.7	51	—24	0.79
Fort Bridger, Wyo	27.5	50	5	0.18
Fort Fred Steele, Wyo	24.2	47	—14	0.50
Fort Union, N. Mex	33.5	65	— 6	0.30
Fort McDermitt, Nev	35.8	54	19	0.89
Carson City, Nev	41.8	69	17	0.18
Hydesville, Cal	50.3	72	34	3.43
Princeton, Cal	54.4	72	33	0.57
Salinas, Cal	50.3	75	32	0.05
Oakland, Cal	54.1	70	41	0.48
San Raphael (near), Cal		73	30	0.99
Sacramento, Cal	53.3	72	32	0.43
Fall Brook, Cal	53.9	85	37	0.13
Angel Island, Cal	55.9	82	44	0.38
Benicia Barracks, Cal	54.3	69	41	0.31
Alcatraz Island, Cal	53.2	69	45	0.12
Fort Bidwell, Cal	40.0	66	21	1.33
Fort Gaston, Cal	50.9	70	33	6.20
Presidio of S. F., Cal	53.5	73	39	0.20
Fort Mason, Cal	55.0	67	47	0.32
Eola, Oreg	46.5	68	32	7.06
Bandon, Oreg				12.42
Albany, Oreg	47.9	62	34	5.82
East Portland, Oreg		53	28	6.08
Fort Klamath, Oreg	35.5	52	8	3.64
Bainbridge Island, W. T.	44.8	58	31	5.40
Tacoma, Wash. T	45.0	55	31	4.16

fair days, 8; average number of clear days, 10; warmest days, 9th and 28th; coldest day, 11th.

Prevailing direction of wind, northwest.

A general snowfall is reported on the 12th at all stations except Mobile, Newton, and Clintonville. It was seven inches deep at Russellville, Carrollton, and Marion. Stations in north Alabama report additional slight falls of snow on the 10th, 13th, 14th, and 16th.

Greatest force of wind is reported by Mobile to be thirty-two miles an hour from the southwest; Chattanooga reports thirty miles an hour on the 9th from the northwest; Montgomery reports twenty-seven miles an hour from the west. All stations report a gale on the 9th, lasting about thirty minutes and accompanied by hail. This preceded the cold wave predicted upon that day, and struck the following points at the times specified: Russellville, 10 a. m.; Mount View, 11 a. m.; Birmingham, 12.20 p. m.; Roanoke, 2 p. m.; Auburn, 3 p. m.

Thunder storms are reported from Summerville, Union Springs, and Newton on the 5th, accompanied by hail and wind; from Russellville, Centre, Tuscumbia, Birmingham, and Tuscaloosa on the 17th; from Brundidge on the 24th. Roanoke, Union Springs, and Tuscumbia report some electricity in connection with the gale of the 9th.

Ice is reported upon eleven days at Jacksonville, nineteen days at Florence, thirteen days at Tuscumbia, nine days at Russellville, and ten days at Auburn.

The following meteorological summary for February, 1885, for Georgia, has been forwarded by Mr. R. J. Redding, State Meteorologist at Atlanta:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
	°	°	°	
Northern Georgia	70.0	1.0	37.2	4.75
Central Georgia	78.0	13.0	43.6	3.42
Southern Georgia	74.0	18.0	49.4	3.70
State	78	1.0	43.4	3.96

The following meteorological summary and accompanying remarks are from the February report of the "Indiana Volunteer Weather Service," under direction of Professor W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Monthly mean.	
	°	°	°	
Northern counties	54.0	—25.0	14.2	1.83
Central counties	60.0	—26.0	17.2	1.79
Southern counties	69.0	—15.0	23.6	2.48
State	69.0	—26.0	18.3	2.03

The most marked meteorological features of the month, were the passage of the severe storms of the 8th and the 9th across the state from the southwest to northeast, accompanied by thunder, lightning, rain, snow, and sleet, and the cold wave which followed on the 10th. The first nine and the last two days of the month were moderate; those between were unusually cold. The average temperature for the month was from 8° to 14° below the normal.

The average temperature for the season was from 5° to 10° below the normal in the various counties. The precipitation was very near the normal, the snow fall being considerably above.

The following meteorological summary and accompanying remarks are from the February, 1885, report of the "Indiana Weather Service," under direction of Professor H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
	°	°	°	
Northern counties	54.0	—25.0	13.4	1.98
Central counties	65.5	—26.0	17.8	1.71
Southern counties	69.0	—17.0	23.9	2.29
State	69.0	—26.0	18.4	1.99

The mean temperature for the state, 18°.4, is 14°.0 below that for last year; 14°.7 below the mean of fourteen years at Indianapolis; 12°.0 below the mean of nine years at Wabash; 11°.1 below the mean of three years at Worthington; 18°.8 below the mean of seven years at Blue Lick, and 9°.7 below the mean of six years at Lafayette.

The mean temperature for the three winter months at Wabash was 6°.3 below the mean of the same months for nine years.

The mean precipitation for the state, 1.99 inches, was 3.18 inches below that for last year; 1.62 inches below the mean of fourteen years at Indianapolis; 1.50 inches below the mean of nine years at Wabash; 0.38 inch below the mean of three years at Worthington, and 2.37 inches below the mean of six years at Lafayette.

The mean snowfall for the state, 10.92 inches, is 7.12 inches above that of last year. The snows seriously interfered with the operations of railroads, this being especially so on the roads running north and south.

The thunder-storm on the night of the 8th and the morning of the 9th was noted in all sections of the state.

The following is an extract from the Illinois "Monthly Weather Review" for February, 1885, published under the direction of Mr. Charles T. Mills, Springfield:

The summary of meteorological observations contained in this review has been compiled from the weather reports received from the Signal Service and voluntary observers reporting to the Illinois Department of Agriculture.

February, 1885, was remarkable for low temperature, and in comparison with the corresponding month in former years, unusual depth of snowfall, and light precipitation.

The snowfall during the month averaged 16.23 inches at stations in the northern division; 9.41 inches at stations in the central division; and 6.80 inches at stations in the southern division.

At Aurora, Kane county, in the northern division, 20.90 inches of snowfall is reported for the month of February. The monthly snowfall in the vicinity of Warsaw, Hancock county, in the central division, was 17.40 inches, and 16.50 inches at Greenville, Bond county, in the southern division.

Temperature.—The average temperature during the month was much below the normal at all stations named in this report.

The lowest mean temperature for the month of February at any of the stations reporting was 7°.70 at Marengo, McHenry county; the highest 31°.80, at Cairo, Alexandria county. The monthly mean temperature in the three divisions of the state during the month, was as follows: northern division, 11°.36; central division, 18°.67; southern division, 25°.86. The monthly mean temperature for the state was 18°.63. The lowest temperature reported during the month was —32°.00, on the 13th, at Wilton Centre, Will county. The greatest departures from the mean February temperature are reported by the observers at the following stations, where the temperature ranged as noted from ten to twenty degrees below normal: Keokuk, opposite Hancock county, —20°.30?; Marengo, McHenry county, —14°.90; Sycamore, DeKalb county, —14°.17; Aurora, Kane county —14°.10; Swanwick, Perry county, —14°.40; Peoria, —12°94; Mattoon, Coles county, —12°.83; Greenville, Bond county, —11°.92; Centralia, Marion county, 11°76; Anna, Union county, —11°.20; Springfield, Sangamon county, —10°.88; Prairieville, Lee county, —10°.77.

The lowest temperature reported during February in the northern division of the state was noted on the 11th and 13th. The temperature at four stations was —7°.0 on the 11th and from —22°.0 to —32°0 at four stations on the 13th.

In the central and southern divisions of the state the lowest temperature in February was noted on the 10th and 20th. The low temperature in the central division was from —11°.0 to —14° at four stations on the 10th, and from —14°.0 to —20°0 at four stations on the 20th.

In the southern division the extreme low temperature during the month was noted on the 10th and 20th. The temperature ranged from —5° 50 to —15°.0 at five stations on the 10th, and from —0°.60 to —14°.0 at five stations on the 20th.

The February mean temperature of the state has been as follows during the past five years: 1881, 23°.09; 1882, 39°.41; 1883, 26°.44; 1884, 30°.16; 1885, 18°.49.

Precipitation.—The observers, with one exception, report the precipitation less than than of any previous corresponding month represented in this report. The February rainfall of the state the past five years has averaged as follows: 1881, 4.73 inches; 1882, 4.63 inches; 1883, 6.29 inches; 1884, 4.02 inches; 1885, 1.29 inches.

There was no precipitation worthy of mention in any portion of the state on February 1, 2, 3, 10, 11, 12, 13, 14, 16, 18, 19, 20, 21, 22, 25, 26, 27, and 28. The precipitation was quite general over the state on the 8th, 9th, and 15th. The heaviest daily precipitation, including rain and melted snow, reported during the month, was two inches at Wilton Centre, Will county, on the 9th; one inch at Prairieville, Lee county, on the 8th; one inch at Marengo, McHenry county, and 1.16 inches at Aurora, Kane county, on the 9th. The monthly precipitation exceeded two inches at the following stations: Wilton Centre, Will county, 2.76 inches; Aurora, Kane county, 2.09 inches; Chicago, Cook county, 2.01 inches. The monthly precipitation averaged 1.83 inches in the northern division, 0.83 inches in the central division and 1.06 inches in the southern division.

In the northern division there was, at several stations, an average of ten clear, ten fair, and eight cloudy days. At the stations in the central division there was an average of ten clear, ten fair, and six cloudy days. At the stations in the southern division there was an average of ten clear, eleven fair, and seven cloudy days.

State summary.

Highest barometer, 30.700 inches, at Wilton Centre.
Lowest barometer, 29.124 inches, at Peoria.
Mean barometer, 30.083 inches.
Range of barometer, 1.566 inches.
Mean relative humidity, 73.33 per cent.
Highest temperature, 72°.00, at Marion.
Lowest temperature, —32°.00, at Wilton Centre.
Mean temperature, 18°.49.
Greatest daily range of temperature, 42°.00, at Sycamore.
Least daily range of temperature, 1°.00, at Aurora and Pana.
Mean daily range of temperature, 18°.54.
Average number of clear days, 10.
Average number of fair days, 11.
Average number of cloudy days, 7.
Average number of days on which rain fell, 7.
Greatest number of days on which rain fell, 12, at Keokuk.
Least number of days on which rain fell, 3, at Mascoutah and Centralia.
Mean rainfall, 1.29 inches.
Average daily rainfall, .048 inch.
Greatest rainfall, 2.76 inches, at Wilton Centre.
Least rainfall, .66 inch, at Collinsville and Swanwick.
Average depth of snowfall, 10.85 inches.
Prevailing direction of wind, nw.

The following is an extract from the February, 1885, report of the "Louisiana Weather Service," under direction of Mr. Robert S. Day, New Orleans:

General notes.

The month has been the coldest on record since the establishment of the Signal Service, both at New Orleans and Shreveport, by several degrees. Five cold waves of greater or less duration crossed the state, accompanied by snow and hail, and ice in certain sections remote from the Gulf. The temperature was continuously cool for the season, delaying abnormally all vegetation. Northwest winds prevailed, veering to ne., e., and back to n., or rapidly round by the s. with showers to w. and nw. again. With the south wind low pressure prevailed. No severe storms are reported.

Farm work has commenced, and the stage of the river is encouraging to planters in the lowlands.

State summary.

Mean temperature for February, 46° 20; highest temperature, 81°, Whyteville and Cheneyville, 9th; lowest temperature, 14°.6, Shreveport, 10th; greatest daily range, 42°.20, Shreveport, 9th; least daily range, 2°, Mandeville, 2d.

Average rainfall, 3.18 inches; greatest daily rainfall, 2.46 inches, Alexandria, 24th; greatest rainfall for month, 4 46 inches, Cheneyville; average rainy days, 6.

River at New Orleans fell during the month 2.1 feet; river at Shreveport fell during the month 8.5 feet; river at Monroe fell during the month 6.1 feet; river at Alexandria fell during the month 14.9 feet.

Frosts.

Lake Providence, 1st, 2d, 7th, 10th, 11th, 16th, 19th, 20th, 21st, and 26th; Delta, 2d, 5th, 6th, 7th, 14th, 16th, 19th, 20th, 21st, 26th, and 27th; Vidalia, 10th, 19th, 21st, and 26th; Shreveport, 1st, 2d, 6th, and 27th; Cheneyville, 1st, 10th, 16th, 19th, 20th, and 26th; Whyteville, 1st, 10th, 16th, 19th, 20th, and 26th; New Iberia, 6th, 16th, 26th, and 27th; Franklin, 10th 16th, and 27th; Donaldsonville, 10th, 14th, 16th, 19th, 26th, and 27th; Mandeville, 10th, 11th, 16th, 17th, and 27th.

The following is an extract from the February, 1885, report of the "Minnesota Weather Service," under direction of Prof. W. W. Payne, of the Carleton College, Northfield:

Highest barometer during the month, 30.455 on the 22d; lowest barometer during the month, 29.510 on the 3d; range of atmospheric pressure, .945.

Highest temperature, 40°.0 on the 2d; lowest temperature, —31°.0 on the 10th; range of temperature, 71°.0.

Mean temperature, 6°.5.

Mean relative humidity, 88.4 per cent.

Prevailing wind, west; maximum velocity of wind (per hour), 28 miles on 28th.

Total precipitation (in inches), 0.29; depth of snow at close of month (in inches), 7.5; total snowfall for month (in inches), 2.6.

Aurora, 11th.

Frosts, 13th, 27th.

Mean velocity of wind for month per hour (in miles), 8.5; total movement of wind for month (in miles), 5,730; average movement of wind per day (in miles), 204.6.

The following is an extract from the February, 1885, report of the "Missouri Weather Service," under direction of Prof. F. E. Nipher, Saint Louis:

February, 1885, has been unusually cold with deficiency of precipitation.

The lowest temperature reached at the central station was —12° on the 10th, the maximum of that day being —3°. This has been exceeded but once before viz.: on February 3d, 1856, when Engelmann recorded —15°. The temperature has never been known to fall below zero after the 21st, a temperature of —4°.5 having been observed by Engelmann on that date in 1838. During last month the temperature reached —7°.3 on the 20th. The temperature fell below 32° on twenty-four days out of twenty-eight, and on thirteen days it did not rise above 32°. It fell below zero on five days, and on one day it did not rise above zero. The 27th and 28th were, however, mild and springlike, the maximum on the 28th being 66°. The mean temperature was 23°.1, which, with one exception (viz., in 1838, when the mean February temperature was 20°.8), is the coldest February ever observed in Saint Louis.

The coldest temperature observed in the state were —23° at Savannah, —22° at Kirksville, —21°.7 at Oregon, —20° at Sedalia and Miami. The highest minimum was 0°.6 at Cairo, Illinois. The highest maximum was 68° at Centreville. The rainfall (melted snow) has been less than one inch in the eastern and southern part of the state, except in the extreme southwest, where the fall was slightly above one inch. The rain was also slightly above one inch over the rest of the state.

At the close of the month the snow had all disappeared in the southern part of the state, and only the rapidly disappearing drifts remained in the northern part.

At Oregon the Missouri river has been blocked since the middle of December.

Lexington reports wheat uninjured, but peaches all killed.

The following is an extract from the February, 1885, report of the "Nebraska Weather Service" under direction of Professor Goodwin D. Swezey, of Doane College, Crete:

The unusual cold weather of the last two months has continued, the temperature remaining about as much below the normal for February as for January, viz: about eight degrees for the mean temperature and ten degrees for the noon temperature. It has been the coldest February for eight years since the weather service was organized. The extremes of temperature, however, both high and low, have been about as usual.

It has also been, with one exception, the February of greatest snowfall; the number of cloudy days has been rather larger than usual. Thunderstorms, which usually occur in February to a limited extent, have not been reported, except from the western part of the state, a single one occurring in the Republican valley.

The average of rain and melted snow, chiefly the latter, for the different sections of the state for February, 1885, is as follows:

Northeast section, 0.71 inch; southeast section, 1.10; northwest section, 0.94; southwest section, 1.74. Greatest number of days of appreciable precipitation, eleven at Omaha; least, two at Nebraska City.

The following is an extract from the February, 1885, bulletin of the "New England Meteorological Society," under direction of Prof. Winslow Upton:

Summary.

The following discussion of the meteorological conditions of the month is based upon reports from eighty-seven observers, and upon the current publications of the United States Signal Service:

General conditions.—The month has been characterized by steady cold weather, far below the average for February, as mentioned more particularly below. This period of unusual cold, which prevailed with but little interruption until the close of the month, was a continuation of the cold weather which began about the middle of January. By its prevalence the whole character of the winter has been changed from one of unusual mildness to one of unusual severity. Adopting the calendar division of the winter, the two periods are of nearly equal extent. The mild period prevailed in December and the first half of January and closed with but little frost in the ground; the cold period began sharply and continued until the end of February, which closed with the ground frozen to a depth of several feet. There were several severe storms in February, but an unusual degree of fair weather.

Precipitation.—The amount of rain and melted snow has been nearly normal, on the average, but there is a great disagreement between different stations. Thus, Gardiner, Maine, and Lowell, Massachusetts, report an excess amounting to 86 and 43 per cent., respectively, of the average, while at New Haven, Connecticut, and Providence, Rhode Island, the deficiency was 26 and 22 per cent., and at the summit of Mount Washington the recorded amount was but 47 per cent of that heretofore noted. The form was largely snow, the snowfall varying from five inches on the southern coast to nearly thirty inches in the interior; the greatest amounts reported were twenty-seven inches at Saint John, New Brunswick, and twenty-nine inches at Newport, Vermont. The two most severe storms of the month, on the 9–10th and 16th, were attended by rain at some stations and snow at others.

Temperature.—The temperature was, without exception, below the normal, the amounts varying from 1°.4, at Saint John, New Brunswick, to 11°.8 at Fitchburg, Massachusetts. As this is the most marked peculiarity of the month it will be interesting to examine it more in detail. Not only was the average below the normal, but at some stations it was lower than that of any February covered by the records. Thus, at New Bedford, Massachusetts, where the record is unbroken for seventy-three years, the coldest February heretofore had an average temperature of 21°.4, or 1° higher than that of the past month. At Worcester, Massachusetts, the coldest February heretofore, in the record of forty-seven years, was in 1849, in which the tem-

perature was 2°.1 above that of the past month. At Middletown, Connecticut, the mean temperature was lower, not only than that of any February, but than that of any month in twenty-seven years; the nearest approach was in January, 1875, which was 0°.3 warmer than that of the past month. These low averages are not due to extremes of cold so much as to the persistence of temperatures a few degrees below the normal. In some cases, however, the minimum temperatures recorded were extremely low, —38° being recorded at Woodstock, Vermont, and also at the summit of Mount Washington. The average minimum for the month was, at some stations, below zero, and the average ranges of temperature were large.

Pressure.—Four barometric depressions, in groups of two each, passed over New England, or in the immediate vicinity. The first moved from the northwest over the lakes and down the Saint Lawrence valley, and was accompanied by light snows on the 1st; the second followed nearly the same path, and was similarly accompanied by light snows on the 4th and 5th. Both were followed by severe cold, the temperatures on the 3d being, at northern stations, the lowest of the month. The barometer during this cold period indicated a pressure below the normal, which is a very unusual occurrence. The third and fourth depressions were both storms of great energy coming from the southwest, and were accompanied by severe gales and excessive rain or snow. The former moved down the Saint Lawrence valley on the 10th, while a subsidiary depression developed near New York, which later united with it. The precipitation was rain or sleet, except in the extreme northern portion, and the winds on the coast were high. This depression was followed by a great fall of temperature and rise of pressure, the lowest temperatures of the month having been generally noted on the 12th. The fourth depression was attended by violent gales, and was the most severe storm of the month. Snow to a depth of eighteen inches fell on the 15th and 16th in the Northern states, causing blockades to the railroads, while on the coast the high wind and tide caused much damage. This depression was not followed by an area of high pressure; for four days the pressure was below the normal, though the temperatures were low. On the 27th and 28th a low area northwest of New England existed, and southerly winds and warmer weather were experienced.

Wind.—The greatest velocities were reported on the 16th in connection with the fourth depression above described. The highest were 50 miles per hour at Providence, Rhode Island, and New Haven, Connecticut; 55 at Brattleboro, Vermont; 74 at Blue Hill, Massachusetts (the anemometer cups blown away after this record); 108 at Mount Washington. The total wind movement at Blue Hill, Massachusetts, was 14,278 miles; at Mount Washington, 22,615 miles, the latter being 4,255 miles less than the average.

Miscellaneous.—Auroras were quite generally noted on the 5th, 11th, and 21st.

The amount of snow on the ground at the end of the month is variously estimated. But little remained at some stations on the southern coast, while 16 inches were reported at Dorset, Vermont, 24 at Gardiner, Maein, and 30 at Rowe, Massachusetts.

The following is an extract from the February, 1885, report of the "Ohio Meteorological Bureau" under direction of Professor T. C. Mendenhall:

Atmospheric pressure.—Highest monthly mean, 30.09 inches, at Dayton; lowest monthly mean, 29.89, at Hiram; highest observed pressure, 30.63, at Dayton and Wauseon on the 23d; lowest observed pressure, 29.12, at Hiram on the 9th; range for the state 1.51; station reporting greatest range, Wauseon, 1.42; station reporting least range, College Hill, 1.01.

Temperature.—Highest monthly mean, 27°.7, at Ironton; lowest monthly mean, 11°.9, at Wauseon; highest observed, 68°, at Portsmouth on the 28th; lowest observed, —27°, at Junction on the 13th; range for the state, 95°; station reporting greatest monthly range, Ironton, 79°; station reporting least monthly range, Cleveland, 58°.

Precipitation.—Largest monthly, 3.34, at Pomeroy; least monthly, 0.61, at Oberlin and Toledo.

Winds.—Prevailing direction, southwest.

The following is an extract from the February, 1885, report of the "Tennessee Weather Service," under direction of Hon. A. J. McWhirter, Nashville.

The weather during the month of February was generally disagreeable, with abnormally low temperature and marked deficiency in rainfall. Among the special features of the month was the thunder-storm of the 9th, with its accompaniment of hail, and high wind in some localities.

The mean temperature for the month was 33°.77, more than 11° below the mean of February of last year, and only 0°.19 above the mean of the month previous. The mean of maximum temperatures was 67°.57 and the mean of minimum temperatures 2°.8, or 2°.67, and 4°.7 below the respective means for the corresponding period of last year. The maximum temperature was general on the 28th, and the minimum on the 11th.

The average precipitation was only 2.39 inches, 6.06 less than the average for February of last year, which was considerably above the normal. This precipitation was well distributed. The days of greatest precipitation were the 5th, 9th, 15th, and 24th, the last showing the greatest precipitation during the month. A considerable portion of the precipitation was from the frequent snowfalls. Only one day, the 21st, was reported entirely free from precipitation by rain or snow.

Thunder-storms were reported as follows: on the 9th at Chattanooga, Maryville, Andersonville, Quarter, Careyville, Sunbright, Grief, Sweetwater, Grassy Cove, Cookeville, Manchester, Florence Station, Hurricane Switch, Kingston Springs, Dickson, Hohenwald, McKenzie, Henderson, Milan, Trenton; on the 17th at Savannah and McKenzie.

State summary.

Mean temperature, 33°.77; highest temperature, 72°, on the 28th, at Howell, Kingston Springs and Milan; lowest temperature, —4°, on the 11th, at Sunbright; range of temperature, 76°, mean monthly range of temperature, 63°; greatest monthly range of temperature, 73°, at Kingston Springs; least monthly range of temperature, 56°, at Covington; mean daily range of temperature, 16°; greatest daily range of temperature, 44°, on the 9th, at Nashville and Dickson, and on the 28th at Kingston Springs; least daily range of temperature, 1°, on the 8th, at Trenton and Sweetwater, on the 15th at Grassy Cove, on the 16th at Bolivar, on the 24th at Savannah and Henderson, and on the 26th at Sweetwater. Mean of maximum temperatures, 67°.57; mean of minimum temperatures, 2°.8.

Mean depth of rainfall, 2.39 inches; mean daily rainfall, .085 inch; greatest rainfall, 4.37 inches, at Riddleton; least rainfall, 1.10 inches, at Quarter and Barren Plains; greatest local daily rainfall, 1.63 inches, on the 24th, at Chattanooga.

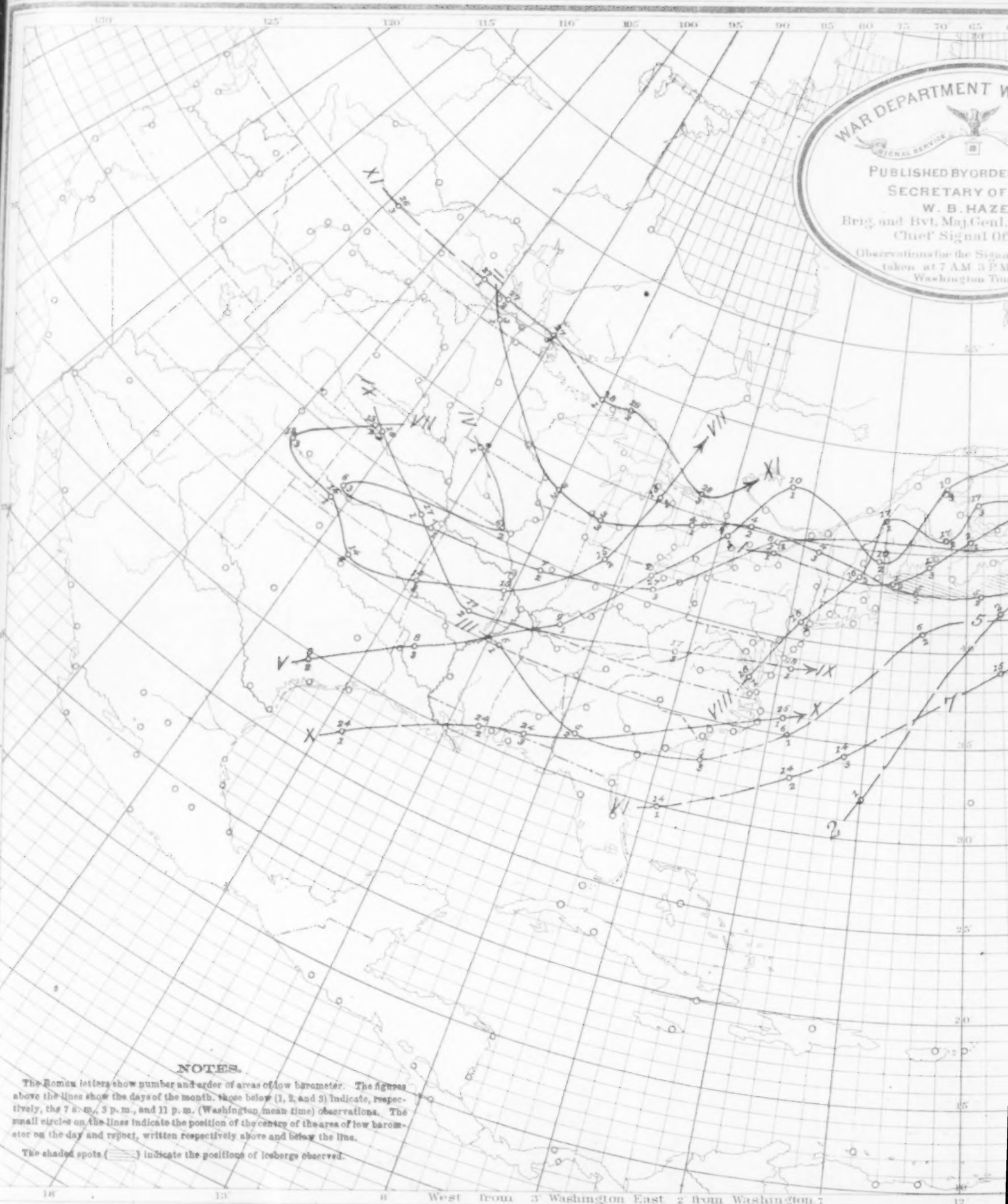
Days of greatest rainfall, 5th, 9th, 15th, 24th; day of greatest rainfall during month, 24th; average number of days on which rain or snow fell, 9; average number of clear days, 8.2; average number of fair days, 8; average number of cloudy days, 11.8.

Average snowfall during month, 2 inches; greatest depth of snowfall during month, 6.50 inches, at Grief and Fostoria; coldest day, 11th.

Prevailing direction of wind, north.

Form 106 C 1884.

Chart I. Tracks of Low-Barometer

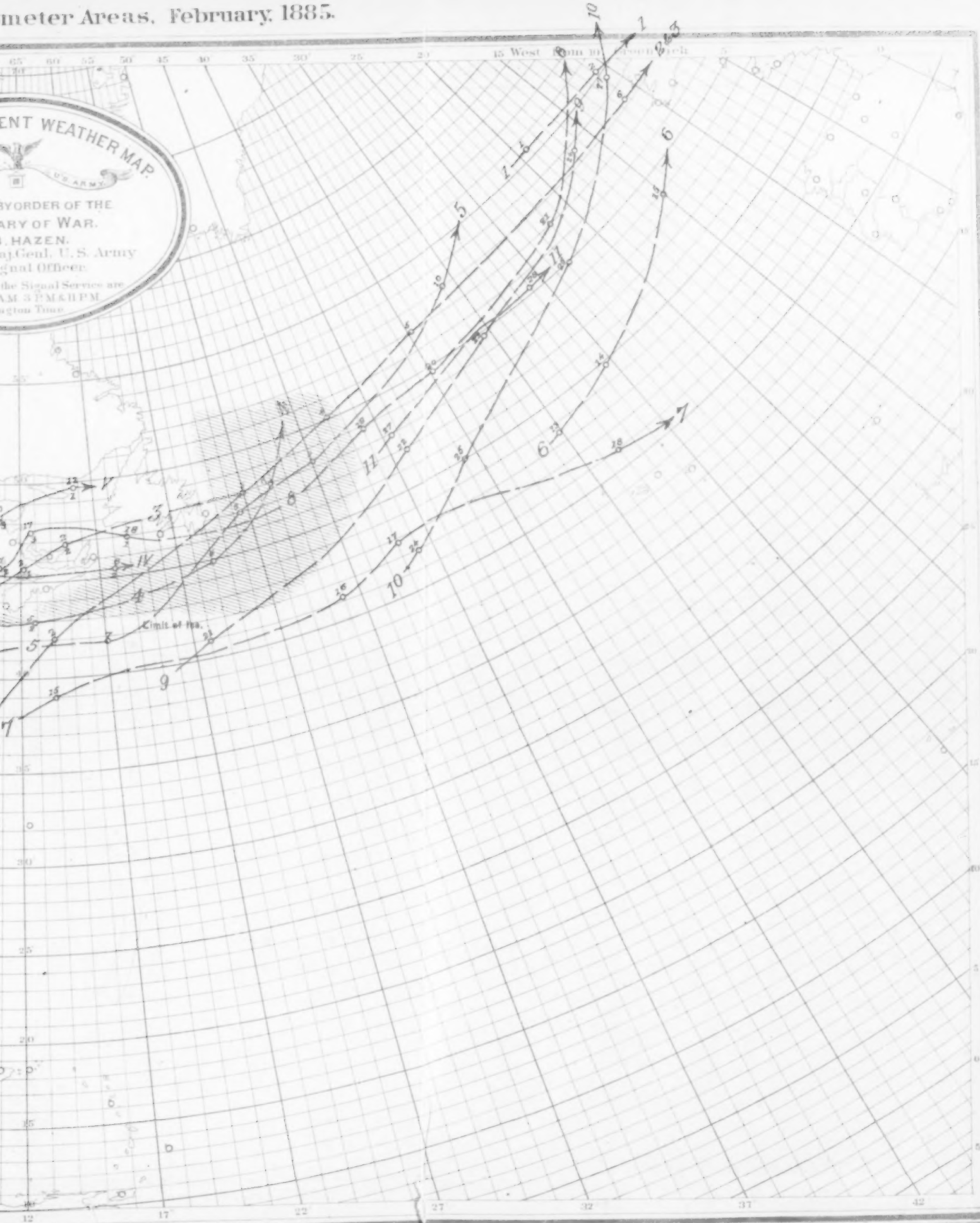


NOTES.

The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month, those below (1, 2, and 3) indicate, respectively, the 7 a. m., 3 p. m., and 11 p. m. (Washington mean time) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

The shaded spots ( ) indicate the positions of icebergs observed.

meter Areas, February, 1885.



Signal Office Lith.

Chart II. Isobars, Isotherms, and Winds. February. 1883.

Chart II. Isobars, Isotherms, and Winds. February. 1885.

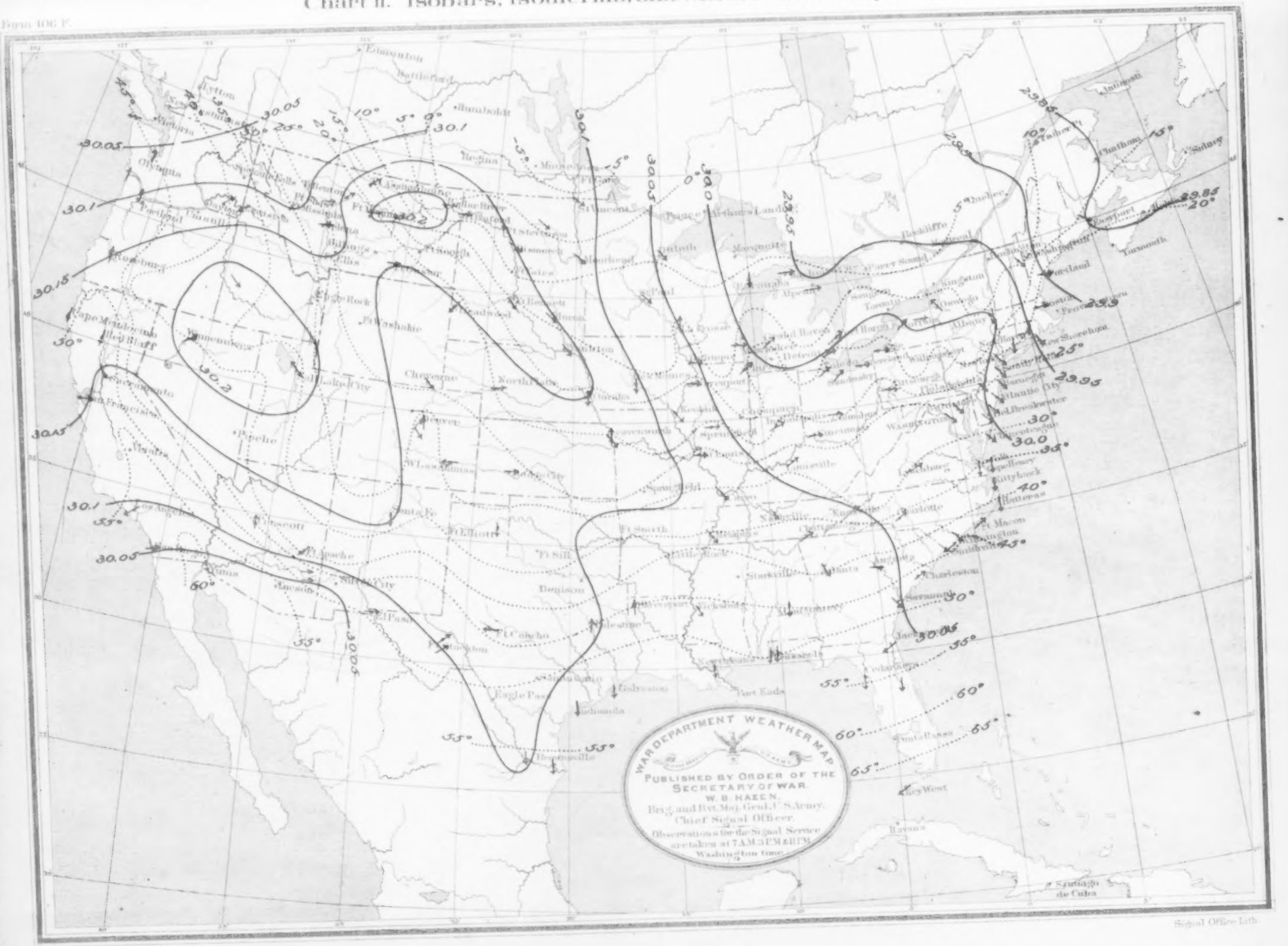

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U. S. Army.
Chief Signal Officer.
Observations by the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.

Chart III. Precipitation, February, 1885.

Chart III. Precipitation, February, 1885.

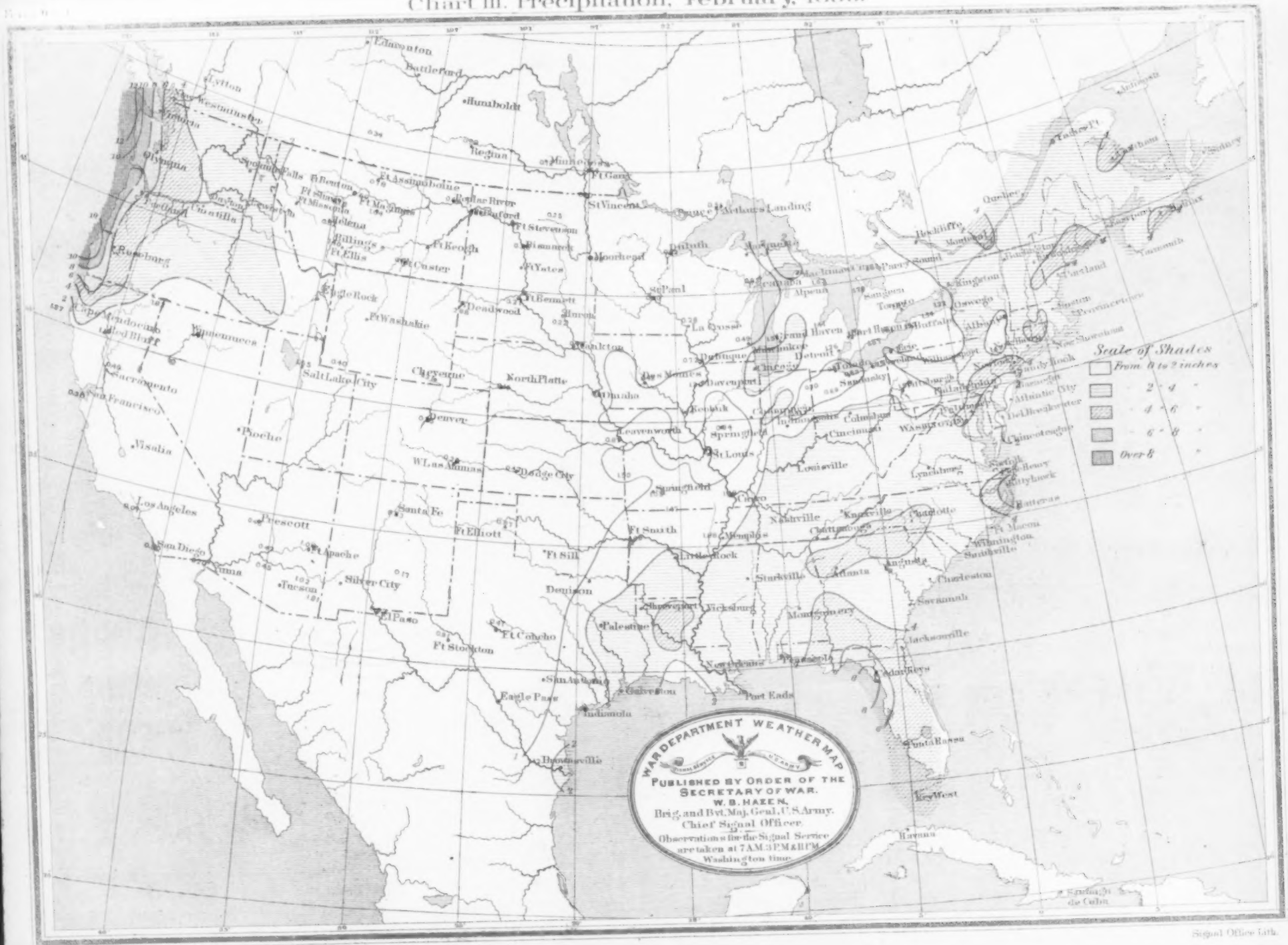
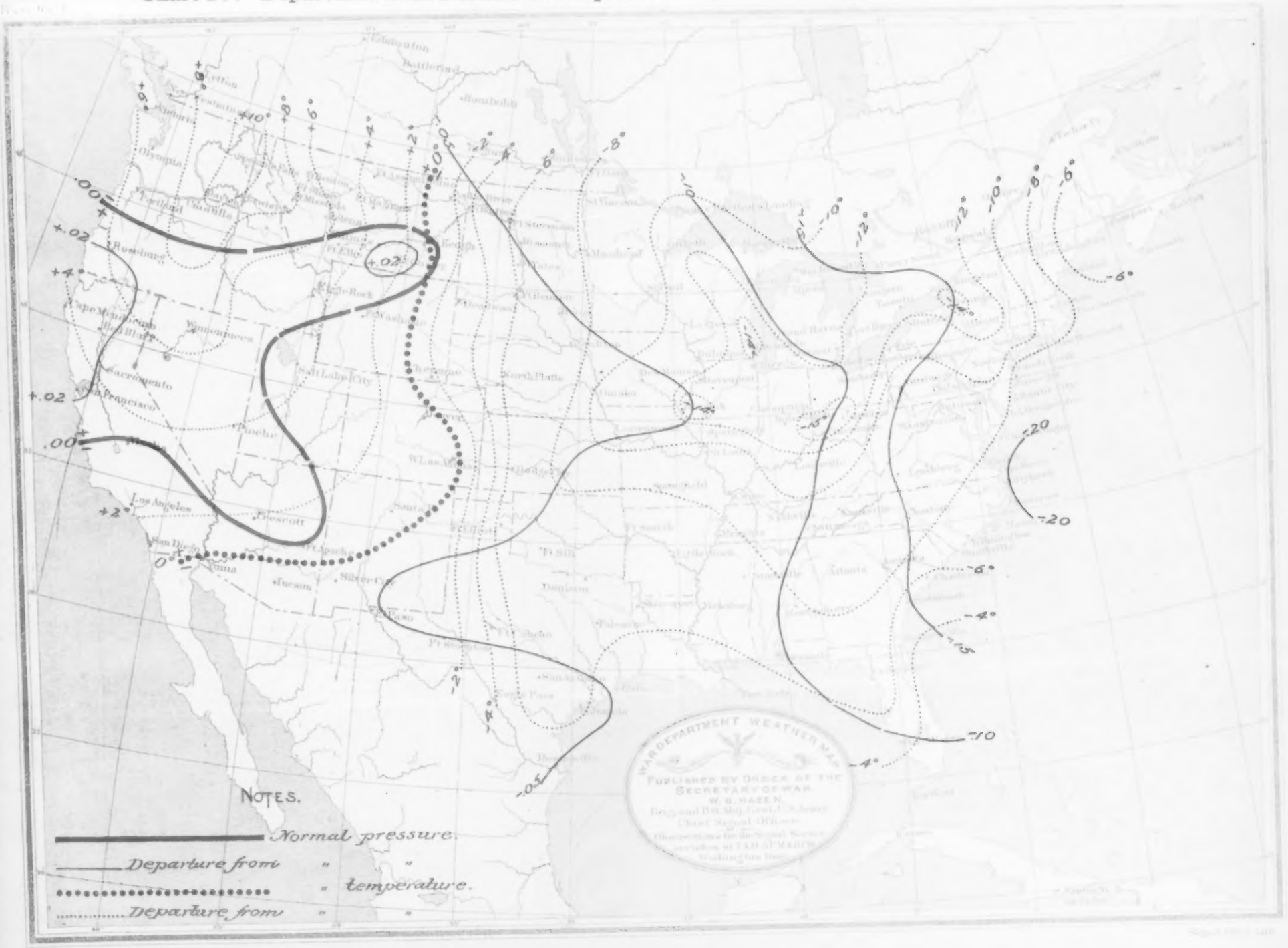

Scale of Shades
From 0 to 2 inches
2 - 4 "
4 - 6 "
6 - 8 "
Over 8
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U.S. Army.
Chief Signal Officer.
Observations for the Signal Service are taken at 7 AM. 3 P.M. & 11 P.M. Washington time.
Signal Office Lith.

Chart IV. Departures from Normal Atmospheric Pressure and Temperature. February, 1885.

Chart IV. Departures from Normal Atmospheric Pressure and Temperature. February, 1885.



Voluntary observers of the Signal Service, on land, from whom meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for February, 1885.

Observer and place of observation.
Anderson, Dr. W. W., Stateburg, S. C.
Altaffer, J. M., Independence, Kans.
Adams, Dr. O. H., Vineland, N. J.
Andrews, L., Southington, Conn.
Abbott, Dr. E. K., Salinas City, Cal.
Bennett, Geo. Bandon, Oreg.
Beloit College, Beloit, Wis.
Bell, Joseph, Franklin, Pa.
Bowen, F. W., Humboldt, Iowa.
Brainerd, Dr. H. G., Independence, Iowa.
Baker, Dr. Henry B., Lansing, Mich.
Beall, Dr. R. L., Lenoir, N. C.
Brendel, Fred., Peoria, Ill.
Bentley, David, Princeton, Cal.
Bowman, Peter, Ruggles, Ohio.
Boerner, Prof. Chas. G., Vevay, Ind.
Bartlett, E. B., Vermillion, N. Y.
Baldwin, A. L., Bethel, Conn.
Bardsley, Jas. G., Nephi, Utah.
Briggs, John, Albany, Oreg.
Boggs, W. R., Brevard, N. C.
Beans, Thos. J., Moorestown, N. J.
Betts, Prof. Arthur, Webster, Oak.
Breed, J. E., Embarras, Wis.
Buck, Mrs. R., Red Willow, Nebr.
Baker, Dr. L. J., Ottumwa, Iowa.
Boies, Lieut. A. H., Hudson, Mich
Becker, Rev. W., Prairie du Chien, Wis.
Ballou, Dr. N. E., Sandwich, Ill.
Boyd, Joseph, Oskaloosa, Iowa.
Beebe, A., Manistique, Mich.
Beecher, Chas., Newport, Fla.
Bryant, A. F., Yutan, Nebr.
Blachly, C. P., Manhattan, Kans.
Barney, Wm., Stowe, Vt.
Charbonnier, Prof. L. H., Athens, Ga.
Cook, S. A., Milledgeville, Ga.
Cotton, Dr. D. B., Portsmouth, Ohio.
Clark, A. C., Wausau, Wis.
Casey, Geo., Auburn, N. Y.
Crawford, E. A., Liberty Hill, La.
Curtiss, G. G., Fallston, Md.
Cornell University, Ithaca, N. Y.
Cocke, A. R., Indianola, Iowa.
Cutting, Hiram A., Lunenburg, Vt.
Crosier, Adam, Laconia, Ind.
Caulkins, John S., Thornville, Mich.
Clark, T. A., Weldon, N. C.
Crawford, D. F. G., Leetsdale, Pa.
Carleton College, Northfield, Minn.
Chandler, Dr. W. J., South Orange, N. J.
Cass, John J., Allison, Kans.
Chase, Pliny E., Haverford College, Pa.
Comstock, Prof. F. M., Le Roy, N. Y.
Cochran, Wm. P., Clay Centre, Kans.
Calhoun, P. B., Austin, Tenn.
Carpenter, Dr. W. B., Leavenworth, K.
Christ, Jacob, Franklin, Wis.
Cheney, Wm., Minneapolis, Minn.
Cox, Prof. T. E., Emmitsburg, Md.
Caffee, Wm. K., Carthage, Mo.
Collin, Prof. Alonzo, Mt. Vernon, Iowa.
Cooper, Dr. Geo. C., Manatee, Fla.
Couch, E. D., Contoocook, N. H.
Cleveland, Dr. G. H., Moorestown, Mich.
Cowgill, Miss S. P., Sterling, Kans.
Culver, G. E., Vermilion, Dak.
Clayton, H. H., Ann Arbor, Mich.
Corbin, F. E., Dudley, Mass.
Chubbs, Thos. H., Post Mills, Vt.
Capen, F. S., Waterville, Me.
Coffin, Prof. S. J., Easton, Pa.
Cutler, J. L., Quitman, Ga.
Davis, Jacob, Rowe, Mass.
Dickinson, Jas. R., Guttenberg, Iowa.
Deming, H. D., Wellsboro, Pa.
Dozier, Wm., Mattoon, Ill.
Dewhurst, Rev. E., Voluntown, Conn.
Day, Theodore, Dyberry, Pa.
Dawson, Wm., Spiceland, Ind.
Dunton, Lieut. W. R., Dorset, Vt.
Dunlap, W. L., Tecumseh, Nebr.
Dow, Roswell, Sycamore, Ill.
Dudley, C. B. Altoona, Pa.
Doton, Hosea, Woodstock, Vt.
Dunlap, J. B., Charleston, Ill.
Dechant, Wm. H., Mahonoy Plane, Pa.
Eliason, W. A., Statesville, N. C.
Eckstein, Rev. M., Conception, Mo.
Ellis, John, Marquette, Nebr.
Ellsworth, W. W., Hartford, Conn.
Elliott, Rev. J. C., Swanwick, Ill.
Ewell, Dr. M. D., South Evanston, Ill.
Fernald, Prof. M. C., Orono, Me.
Fleming, John, Readington, N. J.
Ferris, B. F., Sunman, Ind.
Fouch, Dr. A., College City, Cal.
Foss, E. T., Hydesville, Cal.
Fox, F. E., Fall Brook, Cal.
Ferguson, W., Paterson, N. J.
Fuller, E. N., Tacoma, Wash. T.
Frick, Prof. J. H., Warrenton, Mo.
Friend, Chas. W., Carson City, Nev.
Gates, W. B., Burlington, Vt.
Grathwohl, John, Blooming Grove, Pa.
Gillingham, Milnor, Fallsington, Pa.
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Gibson, John H., Salina, Kans.
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Gerrish, S. H., Sacramento, Cal.
Gray, J. W., Stockham, Nebr.
Goodwin, Wm., North Colebrook, Conn.
Geddings, Dr. W. H., Aiken, S. C.
Gregory, J. W., Sherlock, Kans.
Gordon, Dr. G. G., Swartz Creek, Mich.
Gray, F. R., Yates Centre, Kans.
Garlick, Rev. Dr. J. R., Walkerton, Va.
Heath, E. R., Wyandotte, Kans.
Horn, Dr. H. B., Atchison, Kans.
Hiram College, Hiram, Ohio.
Harvard College Observatory, Cambridge, Mass.
Hammitt, John W., College Hill, Ohio.
Heaton, Isaac E., Fremont, Nebr.
Helm, Thos. B., Logansport, Ind
Hoskinson, R. M., Bainbridge Island, Wash Ter.
Hunter, Dr. T. C., Wabash, Ind.
Haywood, John, Westerville, Ohio.
Hyde, G. A., Cleveland, Ohio.
Hassler, B. K., Chambersburg, Pa.
Hartzler, J. A., Mottville, Mich.
Hall, J. B., Worcester, Mass.
Hager, L. G., Terre Haute, Ind.
Howe, Prof. J. L., Richmond, Ky.
Hoyt, F. C., Easton, Pa.
Houghton Farm Experiment Station, Mountainville, N. Y.
Heatwole, L. J., Dale Enterprise, Va.
Heacock, J. L., Quakertown, Pa.
Hazen, Rev. A., Deerfield, Mass.
Harris, W. C., Dover, N. J.
Hickman, E. A., Independence, Mo.
Harper, Geo. W., Cincinnati, Ohio.
Hodge, Rev., F. B., Wilkes Barre, Pa.
Housekeeper, H. S., S Bethlehem, Pa.
James, John W., Marengo, Ill.
Jones, Dr. E. U., Taunton, Mass.
Jordan, Dr. M. D. L., Milan, Tenn.
Jones, Ira B., Neillsville, Wis.
Knapp, J. G., Limona, Fla.
Keese, G. Pomeroy, Cooperstown, N. Y.
Kuhne, F. W., Fort Wayne, Ind.
Keeler, W. F., Mayport, Fla.
Kirkwood, E., Mauzy, Ind.
Kent, Miss E., Phillipsburg, N. J.
Kauffman, H. W., Dillingersville, Pa.
Lueps, Miss Johanna, Manitowoc, Wis.
Lincoln, A. T., Marion, Va.
Loomis, J. C., Jeffersonville, Ind.
Lay, Dr. F. H., Pueblo, Colo.
Lucas, Dr. G. L., Albion, Idaho.
Luther, S. M., Garrettsville, Ohio.
Ladshaw, Geo. E., Pacolett, S. C.
McDonogh Institute, McDonogh, Md.
McCready, Miss L. A., Fort Madison, Iowa.
Moore, C. R., Bird's Nest, Va.
Munn, A. M., Kalamazoo, Mich.
Metcalf, Dr. John G., Mendon, Mass.
Micklem, J. Howard, Variety Mills, Va.
Meehan, Thos., Germantown, Pa.
Moore, Nathan, Grampian Hills, Pa.
Mikesell, Thos., Wauseon, Ohio.
McPherson, Wm., San Rafael, Cal.
McClintock, F., West Union, Iowa.
Marshall, G., Cresco, Iowa.
Mitchell, Dr. D. W., Harrisville, Mich.
McLain and Law, Seward, Nebr.
Morehead, J. F., Wytheville, Va.
Neal, Dr. J. C., Archer, Fla.
Newbegin, John D., Anna, Ill.
Nelson, P. P., Northport, Mich.
Newcomb, G. S., Westborough, Mass.
Nourse, H. D., Washington, D. C.
Noll, A. B., Somerville, N. J.
Nickerson, W. W., Klamath Agency, Oreg.
Osborn, Dr. Thos. C., Cleburne, Tex.
Olds, H. D., Cedar Rapids, Iowa.
Owsley, Dr. J. B., Jacksonborough, O.
Otis, H. G., Washington, Pa.
Pearce, Thomas, Eola, Oreg.
Pierson, Rev. J., Ionia, Mich.
Powrie, W., Sussex, Wis.
Parrish, Geo. W., Ellensburg, Wash. T.
Patterson, Wm., Salem, N. J.
Partrick, J. M., North Volney, N. Y.
Purdue University, La Fayette, Ind.
Pettersén, Dr. F., Comfort, Tex.
Pritchett, H. C., Huntsville, Tex.
Remington, C. V. S., Fall River, Mass.
Robertson, T. D., Rockford, Ill.
Rogers, F. M., Luling, La.
Renfrew, H. N., Wilton Center, Ill.
Rodman, Thos. R., New Bedford, Mass.
Rockwood, Prof. C. G., Princeton, N. J.
Rerick, R. H., La Grange, Ind.
Rotch, A. L., Blue Hill, Mass.
Richardson, Dr. E. S., Reed City, Mich.
Russel, Geo. W., Wellsburg, W. Va.
Shaw, J., Chester, Minn.
Shriver, E. T., Cumberland, Md.
Seltz, Chas., De Soto, Nebr.
Scott, Thos. G., Forsyth, Ga.
Stucky, Dr. C. T., Helvetia, W. Va.
Stern, Jacob T., Logan, Iowa.
Slade, Elisha, Somerset, Mass.
Slenker, Mrs. E. D., Snowville, Va.
Scribner, H. F. J., Strafford, Vt.
Shriver, Howard, Wytheville, Va.
Smith, H. D., Monticello, Iowa.
Shahan, Chas. C., Edgington, Ill.
Safford, A. T., Williamstown, Mass.
Sherman, W. B., Manchester, Iowa.
Smith, Rev. D. W., Troy, Pa.
Samostz, Oscar, Austin, Tex.
Spooner, Lieut. G. H., Blacksburg, Va.
Staudenmayer, Dr. L. R., Lincolnton, N. C
Snell, Miss S. C., Amherst, Mass.
Shaw, E., Maud, Kans.
Sim, John R., Summit, Va.
Sommerville, W. B., Birmingham, Ala.
Snow, Prof. F. H., Lawrence, Kans.
Shepard, E. M., Springfield, Mo.
Starr, Prof. F., Cedar Rapids, Iowa.
Sadler, Prof. H. E., Emporia, Kans.
Spilman, J. J., Pierce City, Mo.
Stone, W. E., Amherst, Mass.
Sargent, J. B., Leicester, Mass.
Swezey, Prof. G. D., Crete, Nebr.
Tremidley, Dr. J. B., Oakland, Cal.
Todd, Prof. David P., Amherst, Mass.
Teele, Rev. A. K., Milton, Mass.
Truman, Geo. S., Genoa, Nebr.
Turnbo, Silas C., Pro Tem, Mo.
Tillinghast, C. B., Albany, N. Y.
Turner, Ernest, Point Pleasant, La.
Tyrrel, A. C., Madison, Nebr.
Treimer, Geo., Round Grove, Iowa.
Thompson, R. J., Tiffin, Ohio.
Upton, Prof. W., Providence, R. I.
Van Inwegen, C. F., Port Jervis, N. Y.
Voegeli, Adolphus, Des Moines, Iowa.
Venable, Prof. F. P., Chapel Hill, N. C.
Vermillion, W. W., Curryville, Mo.
Washburne Observatory, Madison, Wis.
Wild, Rev. E. P., Newport, Vt.
Williams, Rev. C. F., Ashwood, Tenn.
Wing, Miss M. E., Charlotte, Vt.
West, Silas, Cornish, Me.
Went, E. C., Frankfort, Ky.
Wylie, Wm., Mount Forest, Canada.
Walton, J. P., Muscatine, Iowa.
Wait, S. E., Traverse City, Mich.
Woodstock College, Woodstock, Md.
Wolfe, John H., Wellington, Kans.
West, Dr. Jos. O., Princeton, Mass.
Washington Aqueduct. — Receiving Reservoir, D.C
Washington Aqueduct. — Distributing "
Washington Aqueduct. — Great Falls Reservoir, Md
Washington Aqueduct. — Rock Creek Bridge, D. C.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Weir's Bridge, N. H.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Woodstock, N. H.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Wolfborough, N. H.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Lake Village, N. H.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Bristol, N. H.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Belmont, N. H.
Winipisaugee Lake Cotton and Woolen Manufacturing Co. — Ashland, N. H.
Willis, O. R., A. M., Ph. D., White Plains, N. Y.
Williams, Dr. A. C., Elk Falls, Kans.
Wigg, Dr. Geo., East Portland, Oreg.
Watters, Dr. Jas., Holton, Kans.
Woods, Mrs. Dr. A. G., Maynard, Iowa.
Wetmore, E. L. Tucson, Ariz.
Wright, J. W. A., Greensboro, Ala.
Watson, Dr. S. T., Navatt Point, R. I.
Wadsworth, Dr. J. L. R., Collinsville, Ill.
Watson, Evan, Fort Scott, Kans.
Widman, Rev. C. M., Grand Coteau, La.
Wistrom, M. F., Harvard, Nebr.
Winn, Rev. T. S., Green Springs, Ala.
Ward, J. B., Guilford, Ind.
Whitney, Chas. E., Humphrey, N. Y.
Yetter, Wm. G., Catawissa, Pa.
Yates, T. P., Factoryville, N. Y.
Young, Geo. R., Penn Yan, N. Y.
Zimmerman, F. C., Bunker Hill, Ill.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for February, 1885.

Alcatraz Island, Cal.	Brown, Fort, Tex.	Gaston, Fort, Cal.	McDermitt, Fort, Nev.	Plattsburg Barracks, N. Y.	Sully, Fort, Dak.
Angel Island, Cal.	Barrancas, Fort, Fla.	Hamilton, Fort, N. Y.	Monroe, Fort, Va.	Pembina, Fort, Dak.	Sisseton, Fort, Dak.
Assinaboine, Fort, Mont.	Buford, Fort, Dak.	Klamath, Fort, Oreg.	McHenry, Fort, Md.	Preble, Fort, Me.	Shaw, Fort, Mont.
A. Lincoln, Fort, Dak.	Concho, Fort, Tex.	Keogh, Fort, Mont.	Mount Vernon B'ks, Ala.	Randall, Fort, Dak.	Totten, Fort, Dak.
Benicia Barracks, Cal.	Columbus, Fort, N. Y.	Lyon, Fort, Colo.	McDowell, Fort, Ariz.	Reno, Fort, Ind. T.	Union, Fort, N. Mex.
Bidwell, Fort, Cal.	David's Island, N. Y. H.	Lewis, Fort, Colo.	Meade, Fort, Dak.	Robinson, Fort, Nebr.	Yates, Fort, Dak.
Brady, Fort, Mich.	Ellis, Fort, Mont.	Mason, Fort, Cal.	Niagara, Fort, N. Y. [Cal.	Snelling, Fort, Minn.	
Bridger, Fort, Wyo.	Fred Steele, Fort, Wyo.	Madison Barracks, N. Y.	Presidio of San Francisco,	Saint Augustine, Fla.	

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for February, 1885.

Alabama State Weather Service, under direction of Prof. P. H. Mell, Jr., Auburn, Alabama.
Georgia State Weather Service, under direction of Hon. J. T. Henderson, Atlanta, Ga.
Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Mo.
Nebraska State Weather Service, under direction of Prof. Goodwin D. Swezey, Crete, Nebraska.
Indiana Volunteer Weather Service, under direction of Prof. W. H. Ragan, Greencastle, Indiana.
Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
Ohio State Weather Service, under direction of Prof. T. C. Mendenhall, Columbus, Ohio.
Tennessee State Weather Service, under direction of Hon. A. J. McWhirter, Nashville, Tennessee.
Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
Illinois State Weather Service, under direction of Mr. C. F. Mills, Springfield, Ill.
New England Meteorological Society: Prof. Winslow Upton, of Providence, director; Mr. W. M. Davis, of Cambridge, secretary.
Louisiana State Weather Service, under direction of Robert S. Day, New Orleans, La.
Data have also been used from meteorological records of the Central Pacific and Southern Pacific railway companies.

PRICE-LIST OF

STANDARD METEOROLOGICAL INSTRUMENTS, APPARATUS, TEXT-BOOKS, FORMS AND PUBLICATIONS.

Furnished by J. & H. J. Green, 757 Broadway, New York City.

BAROMETERS.

Common pattern and finish, vernier reading to 100th inch, in pine box:

Reading down to 26 inches			$30.00	Packing and shipping by express,	$2.50
do.	24	do.	31.00	do.	2.50
do.	20	do.	33.00	do.	2.50
do.	14	do. (two verniers)	53.00	do.	2.50

Common pattern and finish, vernier reading to 1,000th inch, in pine box:

Reading down to 26 inches			$34.00	Packing and shipping by express,	$2.50
do.	24	do.	36.00	do.	2.50
do.	20	do.	40.00	do.	2.50
do.	14	do. (two verniers)	54.00	do.	2.50

Best pattern and finish, vernier reading to 1,000th inch, in pine box:

Reading down to 26 inches			$36.00	Packing and shipping by express,	$2.50
do.	24	do.	38.00	do.	2.50
do.	20	do.	42.00	do.	2.50
do.	14	do. (two verniers)	55.00	do.	2.50
Leather case, in place of pine box			8.00	do.	—
Marine barometer			33.00	do.	2.50
Mountain barometer, two verniers, in leather case, to 20,000 feet			63.00	do.	2.50
Mountain barometer, two verniers, in leather case, to 10,000 feet			50.00	do.	2.50
Standard barometer for observatories			75.00	do.	3.25
Barometer tube (glass)			1.25	do.	1.00
Barometer tube, filled and replaced			3.00	do.	2.50
Barometer cistern, complete			4.25	do.	.60
Light brass tripod for barometer			10.00	do.	.85

THERMOMETERS.

Thermometer for dry or wet-bulb			$ 2.00	Packing and shipping by express,	$ .60
do.	wet-bulb, support for		.50	do.	.25
do.	do.	cup for	.50	do.	.25
do.	dry-bulb, support for		.15	do.	.25
do.	maximum registering		5.00	do.	.60
do.	minimum	do.	4.00	do.	.60
do.	solar radiation		10.00	do.	.75
do.	terrestrial radiation		7.00	do.	.60
do.	small, in metal case, for pocket, engraved stem		2.50	do.	.25
do.	water		3.00	do.	.60

L. R. 11547, P. D., 1882.

Furnished by the Hahl Manufacturing Company, 13 Mercer Street, Baltimore, Maryland.

Anemometer, "Robinson's," (velocity)	$25.00	Packing and shipping by express,	$1.05
Electrical recording apparatus, "Gibbon's," (velocity)	27.50	do.	1.05
Anemograph registers (direction and velocity)	80.00	do.	1.20

L. R. 11508, P. D., 1882.

Furnished by John McDermott & Bros., 319 Pennsylvania Avenue, Washington, D. C.

Wind vane, sunset	$ 8.00	Packing,	$—
do. large	65.00	do.	5.00
do. "Eccard's" attachment for use with anemograph	10.00	do.	—
do. base for anemograph	10.00	do.	—
Anemometer, telescopic rod for, new pattern	57.00	do.	3.00

L. R. 11327, P. D., 1882.

Furnished by L. H. Rogers, 75 Maiden Lane, New York City.

Signal Service manifold Forms No. 107 A, in books of 100 forms, per book	$ 1.35		
do.	107 B,	do.	1.60
do.	107 C,	do.	1.60
do.	107 D,	do.	1.70
do.	107 E,	do.	1.75
do.	107 F,	do.	2.00
do.	107 G,	do.	2.00
do.	107 H,	do.	2.50
do.	107 I,	do.	2.75
do.	107 I-sub,	do.	2.75
do.	107 K,	do.	2.75
Signal Service hektographed Forms No. 107 K, per thousand			14.00
Indications (Form 109 B), per hundred			.22

Furnished by James J. Chapman, 915 Pennsylvania Avenue, Washington, D. C.

"Loomis'" Meteorology	1.60

L. R. 4021, P. D., 1883.

Furnished by John Schultzbach, 609 7th Street, Washington, D. C.

Rain-gauge, galvanized iron, with overflow and measuring-stick	$ 2.50
Rain-gauge, copper, with galvanized iron overflow and measuring-stick	1.50
Measuring-sticks, extra	.25
Farmers' weather case	54.70
Case for water thermometer	7.50

L. R. 4051, P. D., 1883.

Furnished by Property and Disbursing Officer, Signal Service, U. S. A., Washington, D. C.

Maps in one color without reports of isobaric lines, each	.015
Maps on manifold paper without reports or lines, in books of 100, per book	2.75
Maps in one color with current reports, isobars, and isotherms, each	.02
Monthly Weather Review	.10
Copies of Daily Bulletin, with Synopsis, Indications, and Facts, with maps, stitched in monthly volumes, each (L. R. 10288, P. D., 1881)	2.25
Farmers' Bulletin, mailed from Washington daily, except Sundays, each	.01
Farmers' Bulletin, mailed from other printing stations daily, except Sundays, each, (postage .01)	.01
International Daily Bulletin, per copy, each, including the Monthly Summary when daily is subscribed for for the entire month	.11
District Maps, each	.02

Any of the above-enumerated instruments, apparatus, etc., may be obtained at the prices named with such *additional cost* of packing and shipping as is shown opposite the items respectively. The charges for expressage are to Washington, D. C., and for other distances will be the actual charges of express companies.

The office will be pleased to procure any of the articles, upon the receipt of their money value, including charges for packing and shipping, but all remittances by draft, money-order, or postal note should be made payable to the parties furnishing the articles desired. In case of money-orders state plainly to whom made payable, but send them in a separate letter. If requested by the parties ordering instruments, a comparison will be made with the standards in this office before forwarding, but, if not, they can be ordered direct, by reference to price list furnished from this office, except those furnished by Messrs. J. & H. J. Green, which should always be ordered through this office. Purchasers must assume all risks of breakage when ordering instruments through this office. Postage stamps cannot be received as money.

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